

# Petroleum Today

**EGYPT SNUBS LNG, PLANS TO SEND GAS TO LEBANON  
VIA THE ARAB GAS PIPELINE**



**THE STORY OF THE  
EGYPTIAN NATIONAL  
PETROLEUM DAY**

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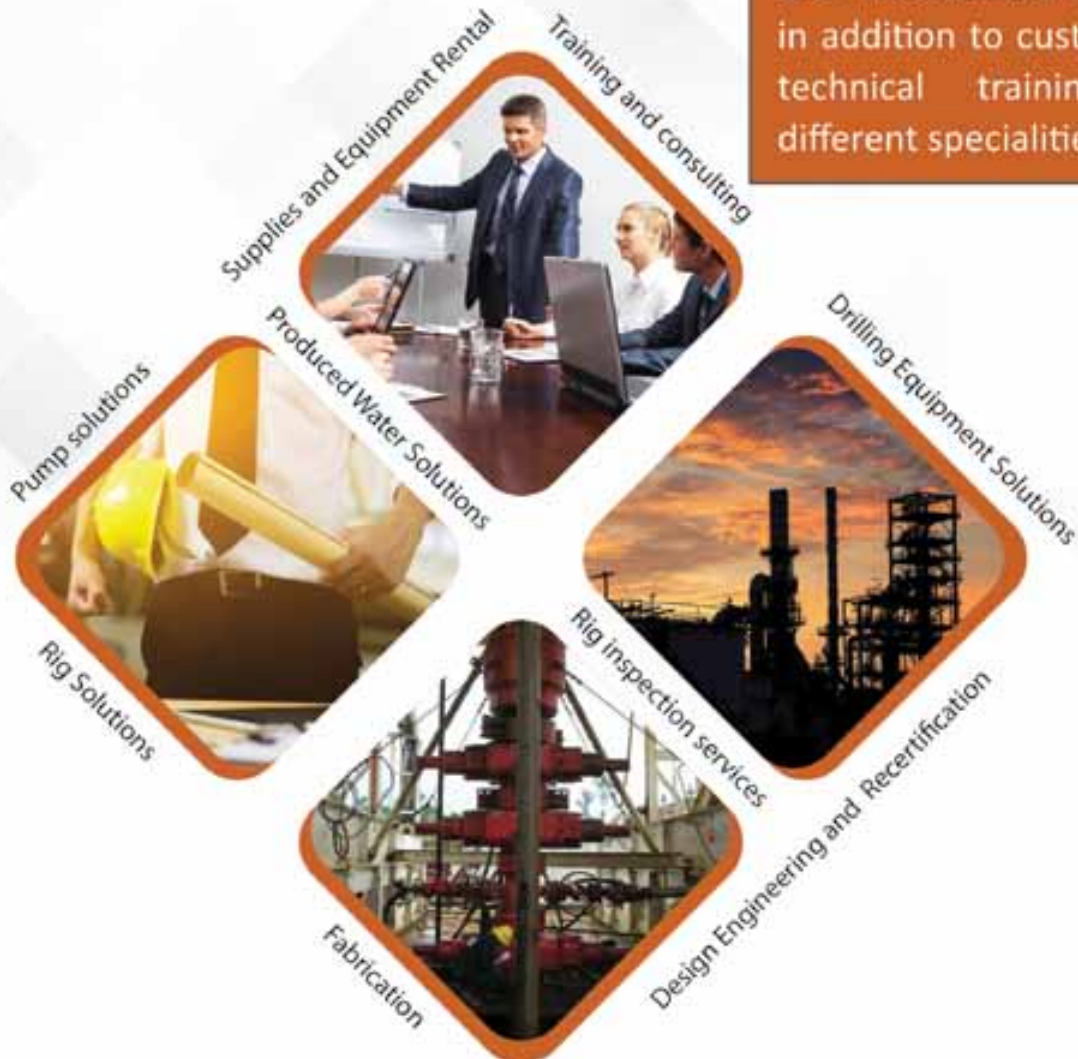
Petroleum Services; Training; Consulting and Supplies

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تتقدم شركة عالم الصحراء وجميع العاملين بها للمهندس طارق الملا وزير البترول والثروة المعدنية وجميع العاملين بقطاع البترول بأجمل التهاني بمناسبة العيد السنوي السادس والاربعون للبترول.

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# Petroleum Today

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بامتياز «العامة للبترول»

٣ ارتفاع إنتاج الغاز الطبيعي في أغسطس الماضي إلى  
٤٥٨٤ ألف طن

٤ وزير البترول يلتقي رئيسة «وينترشال ديا» الألمانية  
للعمليات ويبحث أنشطة الشركة في مصر

٥ انرجين: تعديل اتفاقية شمال ادكو البحرية سيساهم  
بحوالي ٩٠ مليون قدم مكعب غاز يومياً



# Egypt's natural gas is back to Lebanon

**L**ebanon's electricity failed early in October, 2021, plunging the country into further difficulty on top of economic collapse, political corruption, and a deadly port explosion in Beirut last year.

Though limited power was restored after about 24 hours of outages, the collapse of the state-run electrical grid is just the most extreme manifestation of a chronic fuel shortage that has plagued Lebanon for the last year and a half.

Lebanese citizens have struggled with the state's electric company for years, and its shortcomings mean that private generators are common, at least for those who can afford them. Even in an ordinary week, it's common for people to have as little as one or two hours of daily electricity from the state grid.

To help alleviating Lebanon's energy crisis President Abdel Fattah el-Sisi personally supports the export of Egypt's gas.

Egypt will export natural gas to Lebanon in the coming weeks through the Arab Gas Pipeline, Minister of Petroleum Tarek El-Mulla said in a press conference on October 5, 2021.

The Egyptian natural gas was exported to Lebanon through the Jordanian territories in 2009, but it stopped in 2011 after the January 25, 2011 uprising.

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

*Petroleum Today*

## Petroleum Today

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- Calibration for all kind of pressure and temperature transmitters and transducers.



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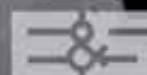


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## East Mediterranean Gas Forum agrees on confronting climate change for sustainable development: minister



Minister of Petroleum and Mineral Resources Tarek el Molla said the member countries of the East Mediterranean Gas Forum have agreed that confronting climate change and providing clean energy sources have become a necessity.

Therefore, “we need to build on the topics we discussed at the UN Climate Change Conference (COP26) to support the global trend to achieve sustainable development,” Molla added.

The minister made the remarks during the 6th Ministerial Meeting of the East Mediterranean Gas Forum, which was held Thursday in Cairo with the participation of his counterparts from Cyprus, Greece, Israel, Jordan and Palestinian president advisor, in addition to some officials and representatives of Italy, France, the European Union, the US, and the World Bank.

## Egypt exports 1m tons of LNG in third quarter of 2021

Egypt’s surpassed its Arab neighbors in natural gas exports during the third quarter of 2021, the country’s minister of petroleum and mineral resources said on Tuesday. The country exported 1 million tons of liquefied natural gas, Tarek Al-Mulla said.

He said the oil and gas sector contributed 24 percent to the country’s gross domestic product in 2019 - 2020 despite the pandemic. Before the pandemic, the sector’s contribution to the GDP was recorded at around 27 percent in 2018 - 2019. A surplus, equivalent to about EGP9.5 billion (\$604 million), in the petroleum balance of payments was reached during 2020 - 2021, compared to a surplus of EGP9.9 billion in 2018 - 2019, Al-Mulla said.



## Orascom joins alliance to establish Egypt’s first hydrogen plant

Cairo-based Orascom Construction is joining the Green Hydrogen Consortium with Fertiglabe, Norway’s Scatec and the Sovereign Fund of Egypt to develop the first Egyptian green hydrogen production facility.

The facility will consist of 100-megawatt polymer electrolyte membrane electrolyzer, making it the world’s largest independently owned facility and the first in Egypt, Orascom said in the statement.

The green hydrogen produced will be supplied as feedstock for up to 90,000 tons of green ammonia to Fertiglabe’s EBIC ammonia production facility in Ain Al Sokhna, Egypt.

The company plans to execute the local works to showcase the green hydrogen facility during COP 27 in Egypt in November 2022.



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## Eni make three discoveries in Egypt's western desert amounting to 50 mln barrel of oil equivalent



**I**talian energy group Eni made three oil and gas discoveries in Egypt's western desert with reserves amounting to about 50 million barrels of oil equivalent. In a statement, the ministry said the oil and gas were found in Meleiha and South West Meleiha concession areas in the western desert and they will add 6,000 barrels of oil equivalent per day.

## Petroleum Ministry launches 1<sup>st</sup> electronic system to manage, distribute butane gas canisters



**P**etroleum and Mineral Resources Ministry launched on Saturday 13/2021/11/ the first electronic system to manage and follow up the circulation and distribution of butane gas canisters in order to supervise the production at domestic level.

In statements, the ministry said that this goes in parallel with ongoing efforts to implement the national project for extending natural gas to all parts of the country.

The minister also inspected the facilities and infrastructure developed the Katameya complex as well as the process of packaging butane gas canisters with about 120,000 daily outputs.

## Egypt constructs gas pipeline in Western Desert

**E**gypt has started the construction of a gas pipeline in the Western Desert with an expected capacity of 15 million cubic feet of gas per day, the head of the General Petroleum Company (GPC), Nabil Abdel-Sadek, said.

Abdel-Sadek made his remarks during a tour with Petroleum Minister Tarek El-Molla of the petroleum regions in the Red Sea's Gulf of Suez and RasGhareb.



# ARAB & INTERNATIONAL NEWS

## Saudi holds top oil supplier to China in October



**S**audi Arabia held its position as the biggest supplier of crude oil to China for an 11th month in a row in October, with volumes up 19.5% from a year ago, customs data showed on Sunday.

Saudi oil arrivals totalled 7.1 million tonnes, or 1.67 million barrels per day (bpd), data from the General Administration of Customs showed, which is 19.5% higher than 1.4 million bpd a year and compares with 1.94 million bpd in September.

Inflows from Russia, including pipeline oil, inched up by 1.3% from a year ago to 6.6 million tonnes last month, or 1.56 million barrels per day (bpd). That compared with 1.49 million bpd in September.

## Basra-Aqaba pipeline should cost under \$9bn: Iraq oil minister



**I**raq's Oil Ministry said in a statement on Wednesday that the Basra-Aqaba pipeline project should cost less than \$9 billion.

It added that negotiations between Jordan and Iraq on the project have reached advanced stages.

However, the pipeline project is still under technical and commercial discussion, with the aim of adding economic value to Iraq and Jordan if the implementation costs are reduced, the Ministry said.

## Kuwait nominates former governor as new OPEC chief

**K**uwait has nominated its former governor to the Organization of the Petroleum Exporting Countries (OPEC), Haitham al-Ghais, to lead the oil producer group after Mohammad Barkindo's term as secretary general, two sources close to the matter said, according to Reuters.

Nigerian Barkindo, whose is due to step down at the end of July next

year, took OPEC's top job in mid-2016 and was granted a second three-year term in 2019. Al-Ghais is the only candidate to be nominated so far, the sources said.

Al-Ghais stepped down as Kuwait's OPEC governor in June this year and was appointed deputy managing director of international marketing at state-owned Kuwait Petroleum Corporation (KPC).

He was previously in charge of KPC's regional offices in Beijing and London before becoming governor to OPEC in 2017.







## WintershallDea planned offshore CCS by 2025 at project Greensand

The Project Greensand CCS Consortium in Denmark is moving decisively ahead. In the upcoming pilot phase the consortium will demonstrate that CO<sub>2</sub> can be injected into the offshore Nini West reservoir in a cost-effective and environmentally safe manner.

The consortium believes the project may in future be able to safely store up to 8 million tonnes of CO<sub>2</sub> per year, equivalent to a quarter of all Danish emissions.<sup>1</sup> WintershallDea, Europe's leading independent gas and oil company, is a core member of the consortium and has decades of experience in the relevant fields.

CCS receives significant political support in Denmark, with the Danish parliament identifying the technology as a crucial means to meet the country's emissions targets. Project Greensand alone could potentially deliver all the CO<sub>2</sub> storage envisaged in the Danish Climate Programme. The pilot targets first offshore injection by late 2022. Emissions will be captured at the Danish cement producer, Aalborg Portland, and transported to the Nini West reservoir by ship. If successful, the pilot would lead to full-scale CO<sub>2</sub> storage in the Nini West field by 2025, subject to the right funding and regulatory conditions.

The Nini West reservoir is located in the Siri Area in the Danish North Sea. Overall, the area is expected to hold storage potential of 0.51- million tonnes of CO<sub>2</sub> per year by 2025, increasing to a potential 48- million tonnes of CO<sub>2</sub> per year by 2030.

## US to release 50 million barrels of oil to ease energy costs



The White House said it had ordered 50 million barrels of oil released from the strategic reserve to bring down energy costs, in coordination with other countries including China.

The move is an effort to bring down rising gas prices. Gasoline prices nationwide are averaging about \$3.40 a gallon, more than double their price a year ago, according to the American Automobile Association.

## UAE, Opening Oil and Gas Summit, Says No Unplugging From Hydrocarbons

Abu Dhabi National Oil Co (ADNOC) Chief Executive Sultan al-Jaber said the world could not «simply unplug» from hydrocarbons and that the oil and gas industry needed to invest over \$600 billion a year until 2030 to meet expected demand.

He was addressing the ADIPEC oil and gas conference following U.N. climate talks in Glasgow that ended with a deal that for the first time targeted fossil fuels as the key driver of global warming.



## CORPORATE NEWS



### Shell sells Western Desert assets in Egypt to Cheiron Petroleum, Cairn Energy

Shell Egypt and Shell Austria, subsidiaries of Royal Dutch Shell, have completed the sale of their upstream assets in Egypt's Western Desert to a consortium made up of subsidiaries of Cheiron Petroleum Corporation and Cairn Energy for \$646m and additional payments of up to \$280m between 2021 and 2024, contingent on the oil price and the results of further exploration.

The sale was announced on 9 March 2021, and the transaction's effective date was 1 January 2020.

With this transaction Shell is refocusing its business in Egypt on our existing infrastructure position. In addition to West Delta Deep Marine and Egyptian LNG joint-venture this includes the Harmattan Deep Project and Exploration acreage in the new seven blocks in the Nile Delta, West Mediterranean and the Red Sea, and in Downstream through Shell Lubricants Egypt.

### Petrojet, Huawei sign MoU to collaborate on ICT solutions, digital transformation

Huawei Technologies, a company specialized in providing ICT solutions, signed a cooperation agreement with Petrojet for petroleum projects and technical consultancy, to achieve digital transformation in line with the strategic vision of the sector.

The agreement was signed on the sidelines of the Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) 2021,

The cooperation agreement between Huawei Technologies and Petrojet aims to maximize the industrial value of the projects undertaken by Petrojet, as one of the companies in the Egyptian petroleum sector, by using the information and communication technology solutions provided by Huawei at all stages of the petroleum projects.



### Dana Gas payments from Egypt and Kurdistan surge 86% on higher oil prices

Dana Gas said payments from operations in Egypt and the Kurdistan Region of Iraq (KRI) increased 86 per cent in the first ten months of the year.

Collections jumped to \$283 million for the ten months to the end of October, from \$152m in the same period in 2020, boosted by a rise in oil prices, the company said on Tuesday in a statement to the Abu Dhabi Securities Exchange, where its shares are traded.



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## TGS, Schlumberger in Red Sea Seismic Survey Project

Seismic data firm TGS and oilfield services giant Schlumberger have teamed up in a 3D seismic survey project in the Red Sea, Egypt. TGS said the project would cover around 6,800 square kilometers and would be acquired with long offsets and processed using a Pre-Stack Depth Migration (PSDM) workflow to enable subsalt imaging ahead of the anticipated license round. Final products are expected in Q4 2022.



## TransGlobe Energy Corporation comment on market speculation



TransGlobe announces that it is aware of market speculation and rumours that the Egyptian Parliament has approved the Company's consolidated and amended Eastern Desert production sharing contracts and that the agreement is awaiting ratification by Egyptian President Abdel Fattah El-Sisi.

While it is the Company's policy not to comment on market speculation or rumours, the Company has received no official confirmation that such approval has been given or that the agreement is awaiting the President's ratification. The Company will continue to engage with Egypt's Ministry of Petroleum and Mineral Resources and the Egyptian General Petroleum Corporation on this matter.

TransGlobe does not intend to make any further public announcements regarding any rumours or speculation unless it determines that disclosure is warranted and in accordance with the requirements of applicable law.

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## Petromaint, Alkhorayef Petroleum Sign Cooperation Agreement

Alexandria Petroleum Maintenance Company (Petromaint) announced that it has signed a cooperation agreement with Alkhorayef Petroleum Company (APC).

Demonstrating Petromaint's commitment to enhancing partnerships with private sector companies, Petromaint's Chairman Ahmed Fouad signed the agreement with APC's Vice President Taher Ali. In addition, Ali expressed his eagerness to begin work in cooperation with Petromaint during the coming period.

APC is one of the leading companies in the field of petroleum services and the construction of oil and gas processing plants. It is also one of the companies specialized in manufacturing and supplying submersible pumps and technology to increase oil and gas production. The company invests in various petroleum projects under the BOT system.



### Halliburton Launches DS365.ai



Fig (1) Halliburton Company today released ten new DecisionSpace® 365 E&P

Halliburton has released DS365.ai cloud service to help customers accelerate their digital transformation with intelligent automation. DS365.ai delivers industry specific artificial intelligence (AI) and machine learning (ML) models to enhance productivity, operational efficiency, and increase asset value. DS365.ai runs on the OSDU Data Platform and uses the interoperable and scalable architecture of iEnergy Cloud. This allows citizen scientists, data engineers and data scientists to design, develop, and deploy AI models at scale. Users can rapidly train pre-built ML models, or create and deploy solutions to enhance subsurface, drilling and production workflows. Users can consume these models as standalone microservices, or in DS365.ai applications such as assisted lithology interpretation, seismic engine and real-time well engineering. “We are excited to introduce DS365.

ai, an industry first approach to quickly extract insights from data silos at a time when data scientists need domain specific accelerators to deepen insights and operations require data science investments to scale and interoperate with existing tools,” said Nagaraj Srinivasan, senior vice president of Landmark, Halliburton Digital Solutions and Consulting. “The DS365.ai models deliver operational value across dozens of successful projects for customers of all sizes.” With over 70 projects and more than 60 AI/ML models deployed at scale, DS365.ai provides a rapid return on investment. Examples of generated value include a national oil company that predicted artificial lift failure, which saved \$4 million across 60 wells. Additionally, an IOC in Latin America deployed an ML seismic conversion methodology to reduce uncertainty that led to a 70 percent reduction in modelling cycle time.



## Next Evolution Of Sanjel Spacer Line Targets Long, Complex Horizontal Wells

A spacer technology said to provide significant time savings for drilling operations has taken a major step forward.

Sanjel Energy Services was granted patents for its VISWEEP DM (dry mix) IS (invert systems). The spacer system that creates efficiencies through its mix-on-the-fly approach was developed at Sanjel Energy's technical centre.

"The VISWEEP DM IS spacer system is the next evolution in our spacer family and another excellent example of our commitment to providing our clients with a broad range of innovative solutions," said Murray Bickley, president and CEO of Sanjel Energy.

Spacer is a fluid that functions as a buffer between well fluids and cement slurry. This helps displace drilling fluid and gets the walls of the wellbore conditioned for cement bonding.



Fig (2) Sanjel Energy Services IS spacer system

## Services Launches Restorecem Self-Healing Cement System

## Superior Energy

Superior Energy Services, a global leader in providing specialized oilfield services and equipment throughout the lifecycle of oil and gas wells, has launched its RestoreCem self-healing cement system to broaden its portfolio of products and enhance its service and support capabilities in the Middle East.

RestoreCem's self-healing behavior enables it to regain its zonal isolation properties and restore the cement sheath against induced cracks, microfractures or micro annuli, minimizing the risk of cement sheath failures that can lead to hydrocarbon percolation within the set cement, or even blowouts. RestoreCem has improved mechanical properties over conventional cement, providing set cement downhole with the resilience, endurance and elasticity to better withstand changes in stresses over the well production cycle.

Shehab Elghoul, regional pumping services manager – MENA, Superior, said, "RestoreCem covers a wide range of downhole temperatures (80 – 300 °F) and a wide range of slurry weights/densities (9 ppg – 20 ppg). Depending on the needs of each specific application, 'RestoreCem,' 'RestoreCem Light,' or 'RestoreCem Heavy' can be selected for use. The wide range of densities the RestoreCem range covers makes it a more flexible solution that can be applied to a wider array of applications."

Recommended RestoreCem applications include unconventional wells with high cyclic production activities that require specially designed cement, such as high pressure, high temperature (HPHT) deep oil and gas wells, thermal wells, gas injection wells and multi fluid production wells. RestoreCem is also ideal for critical cementing operations, similar to production zone cementing, or where cementing best practices cannot be achieved, in addition to formation fractured reservoirs, gas storage wells and plug and abandonment operations.

# SPM Oil and Gas launches KOP AM20 series gate valves

**S**PM Oil & Gas in Dubai has launched its new KOP AM20 Series Gate Valves. The KOP AM20 Series Gate Valves dramatically reduce NPT and the risk of catastrophic well loss while lowering inventory costs.

The KOP AM20 Series Gate Valves allow and shut in flow for

every operation of the wellhead, tree system and

choke and kill manifolds — from drilling and

completion to pumping and production. The

KOP AM20 Series offers unprecedented

safety by ensuring a gas-tight seal from

pressures as high as 10,000 psi to as low

as 50 psi. An advanced coating guards

against high wear, corrosion resistance

and low friction factors for low operating

torque. The KOP AM20 Series also meets

stringent requirements and is qualified

for API 6A Annex PR2F, API 6FA

fire test, API 6AV1 sand slurry test,

extended low gas pressure hold

test, endurance cycle test and sea

water corrosion test. The actuated

KOP AM20 Series surface safety

valves are qualified to Annex F

PR2F, API 6FA and API 6AV1 Class

II.

The KOP AM20 Series features a simplified

design that is not only smaller and lighter for greater cost

savings but also provides part interchangeability to simplify

inventory requirements. The KOP AM20 Series withstands harsh

conditions for more than 600 endurance cycles—representing a 60-

year lifespan—without grease injection. The KOP AM20 Gate Valves increase

the maintenance period by 50 percent as compared to other gate valves in the

market. This will reduce valve maintenance cost by at least 50%. “Our new KOP

AM20 Series Gate Valves enable operating companies and drilling contractors

to satisfy today’s well integrity qualifications while lowering their assets’ life

cycle costs, enabling them to more effectively compete in the marketplace,”

said Ronan Le Gloahec, president of SPM Oil & Gas Eastern Hemisphere



Fig (3) SPM Oil and Gas KOP AM20 series gate valves

## Silixa and NexTier launch IntelliStim frac monitoring and diagnostics system

**S**ilixa and NexTier are pleased to announce that its recently launched IntelliStim monitoring, and diagnostics system has been awarded its first project for a major operator in the Mid-Continent region. The proprietary IntelliStim system enables Silixa and NexTier customers to remotely monitor every aspect of the fracturing operation in real time, empowering decision makers – whether at the wellsite or remotely – with precise control to make on-the-fly adjustments to optimize completion performance. From pre-job treatment design to offset well monitoring and stage-by-stage performance assessments, all surface and downhole activities will be accessible using a single, consolidated interface and easily accessible via the customer’s existing data portal. “By combining



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## WELLTEC LAUNCHES NEW WELL TRACTOR

Fig (4) Welltec Well Tractor 212 CVT

**W**elltec has launched a fully revised and transformed design of the pioneering Well Tractor conveyance solution: Well Tractor 212 CVT, equipped with Continuous Variable Tractoring technology.

The new CVT system automatically maximizes speed and power at all times, optimizing every conveyance run, making operations faster and more efficient than ever before. Commenting on the launch of the CVT, Welltec VP Sales & Marketing, Alex Nicodimou said: “The Well Tractor remains a key service that we provide, it’s the foundation of everything that we do in conveyance and a solid base for our powered mechanical interventions platform. It’s what started the entire domain of interventions on wireline.” “Now our engineers are bringing something special to the market that will ensure we continue to lead in conveyance solutions.” In addition to the new Continuous Variable Tractoring system, the new Well Tractor offers a whole host of innovative functionality and performance features, including a heavily

revised electronics package that is rated to higher temperature demands within a more robust architecture. It also allows for full two-way surface control, that can send commands to the tool downhole and receive diagnostics back at surface. Traditional conveyance platforms are driven hydraulically by a pump, and in many cases, that downhole hydraulic pump is a shared asset that powers multiple wheel sections downhole. The Well Tractor CVT is configured so that each wheel section has its own power unit. These new hydraulic units and wheel sections are shorter and more powerful than ever before, resulting in a system that operates as multiple individual tractors downhole with inherent redundancy, without compromising on overall length. In the event that any one section meets a restriction of any kind, the other sections remain free to power themselves without any detrimental effect. Well Tractor CVT is the next phase in development of Welltec’s conveyance technology – building on more than 25 years of knowledge and experience, it promises to be just as transformative as the original.

AI-driven digital control, integrated completion services and real-time performance assessments in a single package, the IntelliStim system is a truly unique offering,” Robert Drummond, president, and chief executive officer of NexTier, said. “It gives you an overall level of wellsite quality control and efficiency you’ve never been able to achieve until now. And when you compare the nominal investment of our IntelliStim enhancements against what you’d normally pay for these kinds of insights and potential gains in production, I’m certain that operators of all sizes will want to use it on every frac job.” The

IntelliStim system uses Silixa’s Carina Sensing System, which incorporates a Constellation fibre-equipped sensing wireline cable to cost-effectively monitor fracture growth and cluster efficiency to assess frac-design performance in real time. With the ability to be repeatedly deployed in multiple offset wells and retrieved by a NexTier wireline truck, this proven Silixa intervention solution achieves the most accurate measurements and highest signal-to-noise ratio in the industry, which enables operators to identify events farther from the wellbore and deeper into the reservoir.

# Optiq Schlumberger fibreoptic solutions launched

**S**chlumberger has launched Optiq Schlumberger fibre-optic solutions, which deliver multidomain distributed sensing capabilities for a wide range of applications and environments across the energy industry.

Optiq solutions provide continuous and instantaneous measurements, and when coupled with Schlumberger's broad digital offering, deliver actionable insights leading to greater operational performance, efficiency, and reduced environmental impact. "With our recent technological advancements, we have improved access to fibre-optic solutions, enabling the energy industry to harness the full power of this game-changing technology," said Aparna Raman, president, Reservoir Performance, Schlumberger. "Optiq solutions are providing customers with greater subsurface understanding and improved production systems performance—all while reducing operational footprint and carbon intensity." Optiq solutions now span the full range of deployment options: permanently installed behind casing or on tubing, exiting through dry or subsea trees, along pipelines, and on to other midstream and downstream infrastructure; or temporarily deployed via Schlumberger fibre-optic coiled tubing, slickline, or wireline conveyances. Integrated with Schlumberger's leading digital capabilities—including intelligent end-to-end workflows, edge processing, and cloud-native applications—Optiq solutions enable the large volumes of data associated with fibre-optic measurements to be processed up to 18 times quicker than current industry practices and unlock a range of applications from borehole

seismic to production and stimulation monitoring, well integrity and leak detection. Customers can then leverage Schlumberger's industry-leading domain expertise to act on insights faster.

Optiq solutions are represented within the Schlumberger Transition Technologies portfolio, which helps customers minimize emissions and reduce energy consumption while simultaneously driving efficiency, reliability and performance. For example, the Optiq Seismic fibre-optic borehole seismic solution reduces data acquisition time by up to 99%, significantly reducing associated energy consumption and carbon emissions.

The Optiq Seismic solution has been used to acquire more than 70 vertical seismic profiles (VSPs) in more than 17 countries. In the Gulf of Mexico, the solution was used to record 3D VSPs in four producing wells, saving 88 days of acquisition time and reducing CO<sub>2</sub>e emissions by estimated 7,537 metric tons when compared to conventional methods.



Fig (5) Schlumberger fibre-optic solutions work-flow

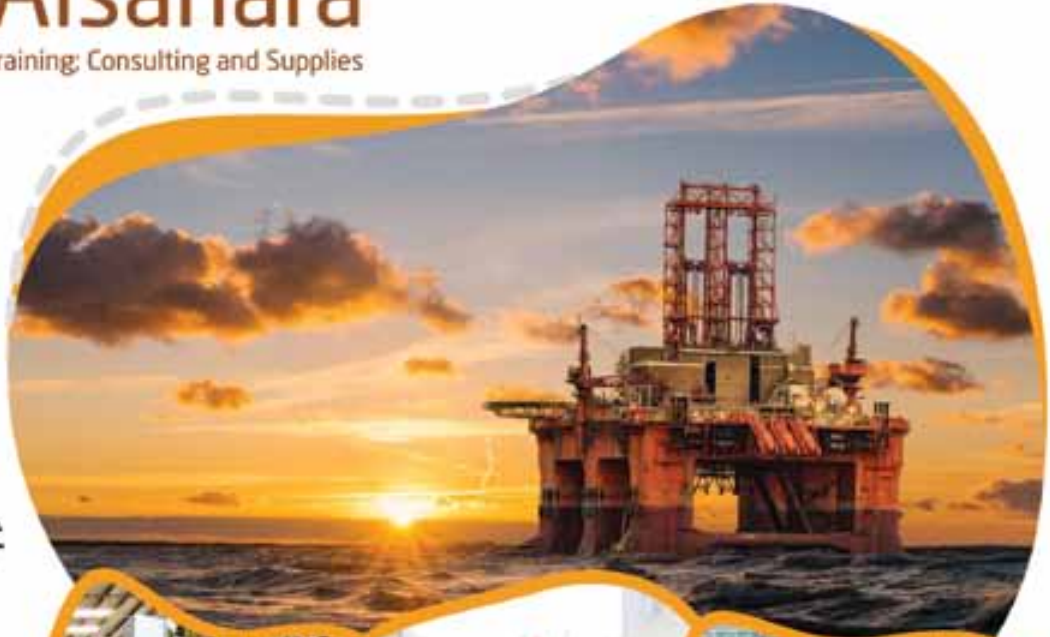


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# THE STORY OF THE EGYPTIAN NATIONAL PETROLEUM DAY



Egypt celebrates this year the forty-sixth National Petroleum Day, The day that tells the story of one of the heroics of the Egyptian oil sector in the darkest circumstances experienced by Egypt. After 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 46 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 their 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.

### **Morgan Field is an October 1973 hero**

Morgan field was discovered in 1965 and its production began a month and a half before the outbreak of the June 1967 war (production began on April 13, 1967), and here was the epic of GUPCO and Morgan field in saving Egypt after the occupation of the Sinai oil fields, which supplied Egypt with about 80% of its total oil production.

For Egypt and the Egyptian oil sector, the divine providence was represented in gifting Egypt a petroleum treasure and a large field, allowing Egypt to compensate for the production of the occupied fields in June 1967, and most of Egypt's petroleum hopes came out of this field.

GUPCO obtained an exploration license for Suez Gulf, summer 1964, and conducted offshore drilling for the first and second wells near the port of Ras Ghareb which were found dry. Then the company determined the third site from the Sinai beach in the direction of Mount Al-Tur and discovered oil from the Balaim and Karim formations, after its development, became the «Morgan field», the first of GUPCO's discoveries in 1965, which led to an increase in crude oil reserves at that time from 133 million tons to 259 million tons.

By the end of 1967, GUPCO finished the seismic survey program in Suez Gulf with a length of 4500 km, as well as the Western Desert with a length of 10,000 km. Due to the circumstances of the aggression in 1967 in Suez, the company intensified its exploration operations in the concession areas in the Western Desert, 33.5 thousand km<sup>2</sup>, These efforts resulted in the discovery of the first natural gas field in Abu Al Gharadiq, Western Desert, October 1969.

Morgan field started production on April 13, 1967, with a daily rate of 2,000 bpd, and within three years, its average production became 300,000 bpd. On August 9, 1970, Morgan field reached the record production rate of





341,000 bpd.

The incredible rate made Morgan field the most important petroleum resource for Egypt with about 70% of the total production

With the beginning of 1973 and beyond, the coral weaves another story during and after the 1973 war, and after this period, the good tidings begin in GUPCO with the discoveries of the July 1973 fields, the Ramadan 1974 field (after the 10th of Ramadan War), the October 1977 field (after the October War), then receiving Shaab Ali on 1979.

After 54 years (1967 - 2021) Morgan field production is almost 25% of GUPCO's daily production, so the losses were heavy.

### **165million 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.







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# HIGH NATURAL GAS PRICES MAKE THIS THE TIME TO BUILD BACK BETTER - WITH CLEAN ELECTRICITY



Experts are forecasting serious sticker shock from home heating bills this winter. Nearly half of United States' households heat their homes with fossil fuels, including natural gas, propane, or heating oil, and these consumers are expected to spend much more this winter because of fuel price increases. That could greatly burden many families and businesses already operating on thin margins. Yet homes that use electricity for heating and cooking are largely insulated from the pain of volatile fuel markets, and they're facing dramatically lower price increases as a result.

Projections say cost increases for households could range anywhere from 22% to 94% more, depending on the fuel used for heating and the severity of the winter temperatures. But the added expenditures for the 41% of U.S. households using electricity for heating are much less stark—these consumers will see only a 6% price increase on average. The projected fossil fuel price spikes are largely due to increased demand, limited supply, declining fuel stores, and shifting investment priorities in the face of climate change.

The fossil fuel industry is already seizing this moment to use high prices to persuade policymakers to vote against clean energy policies, particularly the Build Back Better Act (BBBA). Spokespeople with ties to the fossil fuel industry and some consumer groups are trying to pin higher fuel prices on the proposed legislation even before it has passed, let alone begun impacting fuel markets. But the claim the BBBA would cost Americans and the economy is false.

The facts tell a different story. Adopting smart climate policies and accelerating the clean energy transition are precisely the solutions to counter this vicious cycle by ending our dependence on volatile fossil fuels. The BBBA will ensure reliable, affordable clean electricity for millions of Americans—a key strategy for avoiding future vulnerability. Unlike fossil fuels subject to the whims of a global marketplace, wind and sunshine are always free. So renewable-generated electricity comes with an ultra-low fixed price decades into the future.

By expanding clean energy and electric vehicle tax credits, creating new incentives for efficient all-electric homes, and dedicating new funding for state and local programs, the BBBA provides practical solutions to protect Americans from price shocks, save consumers money, and reduce emissions fueling dangerous climate change.

### What's really causing the gas price spikes?

The U.S. Energy Information Administration's winter 2021 energy price forecasts project that homes heated with natural gas, fuel oil, and propane will see average price increases of 30%, 43%, and 54%, respectively. Those who heat their homes with electricity, on the other hand, should expect a modest 6% increase. At the pump, drivers are seeing some of the highest gas prices in nearly a decade. And the U.S. is not alone. Countries around the globe are experiencing similar price jumps.

A closer look confirms the cause of these high prices is not clean energy or climate policies—it's fossil fuels themselves. First, the U.S. (and the world) are just now feeling the effects of the oil and gas industry's reduced fuel production and spending due to the pandemic. COVID-19 brought the world's economies to a screeching halt, and most countries have not returned to pre-COVID economic activity. During the past 20 months, the oil and gas industry curtailed its production to avoid oversupply as demand fell to all-time lows. Just as businesses were reopening, stored fuel was needed to meet high demand for cooling during 2021's hottest summer on record. February's Texas Big Freeze also disrupted gas distribution and production.

The world is moving again and demand for goods and services is rebounding to pre-pandemic levels. But even

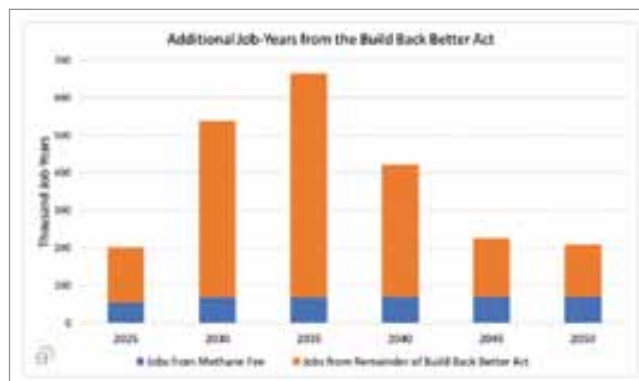
with higher energy demand, OPEC announced it would not inject more oil into the economy. Major oil companies have also held oil and gas spending flat in 2021, with their share of overall upstream spending at 25%, compared with nearly 40% in the mid-2010s. And as climate change threats loom in the financial world, investors are reducing their exposure to the risks of stranded assets, increasingly diversifying and divesting from fossil fuels.

Second, despite strong and sustained growth for renewable energy, energy storage, and electric vehicles, the relatively slow pace to adopt fossil fuel alternatives at scale has left U.S. households and businesses tethered to an industry well-known for price volatility. Today, some oil drillers are using profits from higher gas prices to pay back debt and reward shareholders as demanded by investors, instead of increasing supply. Rising prices for a limited commodity in high demand is generating huge profits for many of the world's largest companies at the expense of U.S. households.

Because 48% of homes use fossil gas for heating and another 10% heat with propane and fuel oil, more than half of U.S. households will feel the impact of rising prices on their home energy bills. One in four U.S. households continues to experience a high energy burden (meaning their energy expenses consume an inordinate amount of their income), and many are still experiencing financial hardships exacerbated by the pandemic. Those with inefficient fossil-fueled appliances, homes, and cars will be hardest hit, and many families with fixed- and lower-incomes could be forced to choose between heat or other necessities.

### We have the solutions—the BBBA will unlock their benefits for all households

Short-term band-aids may be enticing, but long-term policies are the only way out of this negative feedback loop. Clean energy and building electrification will prevent more costly disasters in the future, but they're the very solutions the fossil fuel industry fights at every turn. All-electric homes and vehicles are a natural hedge against the price spikes we're experiencing today since renewables are inherently





devoid of fuel-related price fluctuations.

RMI analysis shows all-electric single-family homes in all regions of the country have lower energy bills than a comparable mixed fuel-homes (i.e., electricity and gas). Electric vehicles also save consumers money. Research from University of California, Berkeley and Energy Innovation found consumers could save a total of \$2.7 trillion in 2050—or \$1,000 per year, per household for the next 30 years—if we accelerate electric vehicle deployment in the coming decade.

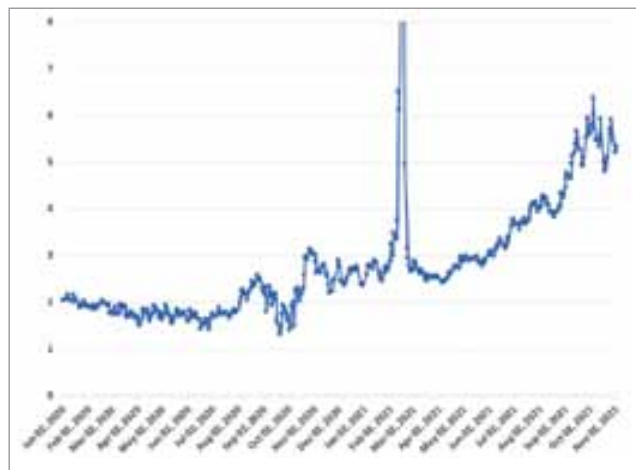
The BBBA would help deliver these consumer savings by expanding and expediting clean energy, while ensuring equitable adoption among lower-income households and underserved communities. Extending and expanding clean energy tax credits; new incentives for electric vehicles (including used electric vehicles); and new incentives for energy efficient homes and all-electric appliances (and electrical upgrades) will reduce up-front costs and spur widespread adoption of all-electric homes, buildings, and cars.

A combination of grants, incentives, and programs will promote private sector investments in a decarbonized economy, while also funding and supporting state and local governments already leading the way. The BBBA also allocates dedicated funding and makes important modifications (such as higher rebate amounts and greater point-of-purchase availability) to ensure these technologies are available to low-income households, underserved urban and rural communities, tribes, frontline communities, and people living in multifamily housing.

Finally, the BBBA proposes to make oil and gas polluters pay for the harm they are causing to people's health and the climate through a methane fee. This fee would cost companies less than 1% of their revenue, meaning the industry would retain over 99% of its profits. In return we'd see substantial reductions of a powerful greenhouse gas and a healthier environment in communities living near fossil fuel production. These benefits also come with a stronger economy—Energy Innovation analysis shows the methane fee would create more than 70,000 jobs by 2050 and boost gross domestic product more than \$250 billion from 2023 to 2050.

### Could U.S. Natural Gas Prices Crash?

An old joke about the economy goes that when your neighbor loses his/her job, it's a recession, when you lose your job, it's a depression. Apparently, not many writing about the global energy crisis have heard that one, since they think soaring natural gas prices in Asia and Europe mean, as New York Times columnist Thomas Friedman puts it, "Every so often the tectonic geopolitical plates that hold up the world economy suddenly shift in ways that can rattle and destabilize everything on the surface."



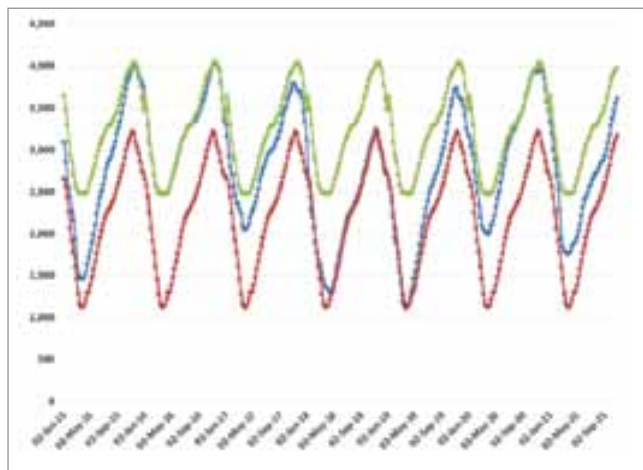
Henry Hub Gas Price (\$/MMBtu) THE AUTHOR FROM EIA DATA.

The reality is that a number of regional market imbalances have caused some energy prices to surge, and those are primarily the result of transient events, such as the late winter cold earlier this year and the Chinese government's efforts to reduce coal consumption. Russian gas exports to Western Europe are well down from last year, apparently because cold weather depleted Russian inventories and they have given priority to rebuilding them. (While a more mundane explanation than Russian pressure to achieve early certification of the Nordstream 2 pipeline, it appears more likely to be the primary cause.)

Oil—and U.S. gasoline prices—have also surged but not because of any underlying conditions, rather the success of OPEC+'s efforts to rebalance the market which have arguably overshot, leaving global oil inventories lower than normal. This was exacerbated by Hurricane Ida, which caused a loss of crude production but also refinery shutdowns that tightened product markets. But OPEC+ has 56- mb/d of unused capacity, so the problem appears readily solvable. Indeed, by the end of the 1st quarter of next year, the IEA forecasts that global inventories will be growing by 2 mb/d, enough to see prices moderate.

Which leaves the U.S. natural gas market, where prices have surged an astonishing 150%, as the figure below shows. Of course, as the second figure shows, the price level, while elevated, is hardly exceptional. More interesting is the fact that drilling in the Marcellus has not increased noticeably: the number of rigs operating there are still less than half the pre-pandemic level. Haynesville drilling has recovered, possibly reflecting better prices received from supplying the LNG export market.

The fact that all three major gas markets—Europe, Asia and North America—are tight reflects more the correlation in their weather, at least this past year. They still remain largely independent, the only connection being some LNG supply



Henry Hub Price (nominal \$/MMBtu) THE AUTHOR FROM EIA DATA.  
which can be switched to the highest priced costumers. (Much LNG is traded on fixed, long-term contracts.) Sadly, benefits to U.S. gas producers from the supremely high LNG prices in Europe and Asia will be limited because export capacity is already operating at near 100%, and not much additional capacity will come on-line.

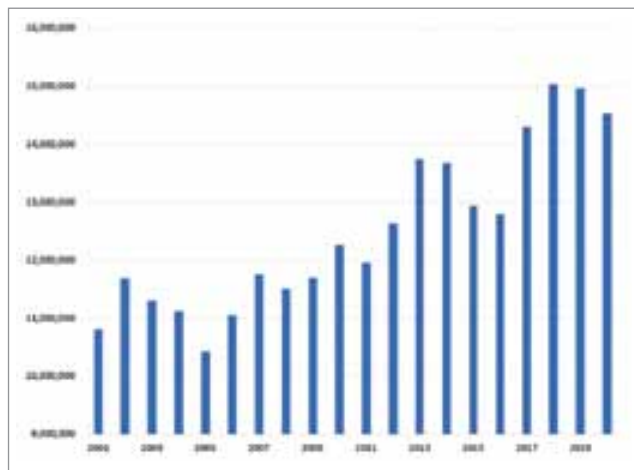
The table below shows the market balance for U.S. gas, and it is clear that the biggest change was the increase in net exports of 6 bcf/d in 2020 and 2021, primarily LNG, a trend the EIA forecasts to continue next year. And the subsequent figure shows U.S. gas inventories and they are approximately 100 bcf below the normal level for this year, but still well above the minimums over the past five years, although growing demand means the needed storage should grow as well. More important, recent weeks have seen inventories growing rapidly.

Which brings us back to that bugaboo of the gas industry, weather. A large amount of natural gas is still normally consumed in the winter and especially for heating. The figure below shows total consumption over the course of November to March the following year, roughly corresponding to winter in the U.S. The difference between a warm and cold winter is roughly 1000 Bcf in demand, far more than the current inventory shortfall.

The EIA forecast is for roughly flat consumption next year, much higher production, and a slight increase in exports. (Only about 1.2 bcf/d of new export capacity is anticipated over the next year, and pipeline exports are unlikely to

EIA SHORT-TERM ENERGY OUTLOOK GAS FORECAST BCF/D OCTOBER 2021							
	2019	2020	2021	2022	Change		
Production	83.06	81.49	92.55	96.51	-1.57	1.06	3.96
Consumption	85.15	83.25	83.23	83.38	-1.9	-0.02	0.15
Net Export	5.34	7.47	11.02	13.34	2.23	3.55	2.32

EIA Short Term Gas Outlook THE AUTHOR FROM EIA.  
U.S. Natural Gas Inventories Bcf THE AUTHOR FROM EIA DATA.



Winter Gas Usage in the U.S. (Mcf/d) THE AUTHOR FROM EIA DATA.  
increase more than slightly.) This means that inventories should grow by 200500- Bcf in 2022, more if the winter is mild, less if the winter is cold. But given past performance in the shale fields, raising production by 2, 3, even 5 bcf/d for the year is readily achievable—if the drilling occurs. (Figure below) As mentioned, drilling has not recovered in the Marcellus, and that is definitely a major indicator of next year's gas market. But if high oil prices send Permian drilling back to pre-pandemic levels, it is possible that associated gas production from that region could rise by 23- bcf/d, a growth level reached in 2018 / 2019, when oil prices were only 75% the current level as the figure showed.

A cold winter and no revival in shale drilling could see natural gas prices remain above \$5, possibly \$6/MMBtu or more depending on the perceptions of traders. On the other hand, a warm winter and/or a surge in drilling in either the Permian or Marcellus could easily bring prices back down to \$3/MMBtu. This would certainly provide some relief to consumers, but also greater profits to LNG exports who are selling spot cargoes at currently elevated prices.



Year on Year Shale Gas Production (Mcf/d) THE AUTHOR FROM EIA DATA.

# EGYPT SNUBS LNG, PLANS TO SEND GAS TO LEBANON VIA THE ARAB GAS PIPELINE



Egypt near Alexandria immediately and that it will supply gas to the Damietta LNG plant only until year end as it prepares to redirect surplus gas exports to Lebanon via the Arab Gas Pipeline. Jordan's Ministry of Energy and Mineral Resources announced in early September it would deliver Egyptian gas to Lebanon after oil ministers of nations responsible for the Arab Gas Pipeline (Egypt, Jordan, Syria, and Lebanon) met in Amman to agree on a regional response to Lebanon's ongoing fuel and electricity crisis, local media reported.



The English language news site Egypttoday.com quoted Egyptian Minister Tarek El Molla as saying, “Egypt is working to speed up coordination for delivering Egyptian natural gas to Lebanon through Jordan and Syria.”

Lebanon is in a state of economic collapse that the World Bank has called one of the worst on record, and, because it lacks foreign currency to pay for energy imports, the country was forced to switch off its two main power plants in July for lack of fuel, plunging the country into a near total blackout.

US sanctions prohibiting transactions with the Syrian government had blocked earlier attempts to deliver Egyptian gas to Lebanon because the gas has to traverse Syrian infrastructure; likewise, electricity from Jordan flows to Lebanon through Syria.

Washington now, however, appears to be willing to issuing waivers to facilitate transit of not only Egyptian gas but also electricity from Jordan; the US is also said to be leading talks to secure World Bank financing to enable Lebanon to pay for these imports, the international news outlet France 24 has reported.

The apparent softening of the US stance enabled the first high-level visit of a Lebanese government official to Damascus since the start of the Syrian civil war 10 years ago when, on 4 September, Lebanon’s interim deputy prime minister ZeinaAkar met with Syrian Foreign Minister Faisal Mekdad in Damascus to discuss Lebanon’s ongoing energy crisis.

The 10 billion m3 capacity Arab Gas Pipeline (Fig. 1) runs from the city of el-Arish in Egypt to Aqaba in Jordan. It continues north to Rehab where it supplies gas to Jordanian power plants before continuing to Syria where it crosses the boarder and connects with the city of Homs.

Until the start of Syria’s civil war in 2011, Egypt had supplied natural gas to Lebanon through the Arab Gas Pipeline system.

On 16 September, Egypt’s ambassador to Lebanon, Yasser Elwi met with Walid Fayyad, Beirut’s Minister of Energy and Water to further discuss resumption of Egyptian gas flows.

The next day, the Middle East Economic Survey (MEES) reported that Egypt’s state-owned Egyptian Natural Gas Holding (Egas) told its partners whooperate the ELNG export terminal—Shell and Malaysia’s Petronas—that it was halting gas supplies “with immediate effect.”

Egas also informed Italy’s Eni and Petronas—operators of



Damietta—that it would supply that facility only until the end of 2021, MEES reported.

Anglo-Dutch Shell and Petronas operate the ELNG export terminal at Idku. The terminal’s two trains have a production capacity of 7.2 mtpa of LNG, according to Shell’s website. Partners in the project also include France’s Engie (Gas de Suez); Egas; and another Egyptian state-owned firm, Egyptian General Petroleum Corporation (EGPC).



Fig. 1—The Arab Gas Pipeline from Egypt to Lebanon.  
Credit: US Energy Information Administration.



Meanwhile, the 7.56-billion-m<sup>3</sup> capacity Damietta Segas LNG terminal west of Port Said only resumed operations in February after having been idled in November 2012 because of an ownership dispute. Eni holds a 50% stake in Damietta as a result of a settlement of the dispute, which was closed in March 2021, while EGAS holds 40% and EGPC holds 10%, according to Eni's website.

"Lebanon needs 650 million cubic metres of gas per year and seeks to receive gas from Egypt that is sufficient for generating 450 megawatts of power at present." Lebanese Minister of Energy and Water Raymond Ghajar (R) said during a joint press conference in Amman, Jordan, on Sept. 8, 2021

#### **Egyptian gas expected in Lebanon by early 2022**

Egypt is expecting to begin exporting gas to Lebanon by early next year, Egyptian Petroleum Minister Tarek El Molla said on Tuesday Nov 16 2021.

Egypt will supply the gas, in line with the quantity that Lebanon had requested, «as soon as we can ... we might expect it end of the year, early next year», Molla said on the sidelines of an oil and gas conference in Abu Dhabi.

«We are just (doing) due diligence, checking the pipelines,» he said.





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ENERGY**





An Interview With

## MR. RANDALL C. NEELY, C.A., CFA

President and CEO, Director  
TransGlobe Energy Corporation



**TransGlobe Energy**  
CORPORATION

***Can we update our readers insight on the TransGlobe strategy in light of the current oil market?***

Given the ongoing oil price volatility, TransGlobe is continually focused on strict capital discipline through operational cost controls and minimizing our exposure to financial leverage by remaining debt-averse. Despite market volatility, we have positioned ourselves as a nimble company with the ability to create value through a balanced portfolio of exploitation, development and exploration opportunities across our diversified onshore assets in Egypt and Canada. This approach has enabled us to build our production base, generate strong cash flows and provide a return to shareholders through a semi-annual dividend.

***Where are the most promising areas / concessions the company is working in?***

We are most excited about our low-risk development operations in Egypt and our newly discovered resource potential in the Cardium play in Alberta. In Egypt we are particularly focused on the continued expansion of our Eastern Desert Concessions. For the past year plus we have been working alongside the Egyptian General Petroleum Company ("EGPC") to develop a framework to extend the concessions and amend our licenses which will provide for the increased development and recovery of the oil in place in those legacy concessions through increased secondary as well as tertiary recovery approaches. We believe that some of the techniques utilized in our

Canadian operations, namely horizontal drilling and multi-stage completions will be directly applicable to certain areas within our concessions in the Eastern Desert.

***TransGlobe has been working in Egypt for more than a decade, what are some attractions in the Egyptian petroleum sector?***

The production and distribution of oil is an integral part of Egypt's economy and the country has developed a well-established service industry to support exploration and development operations, exemplified by an increasingly large and talented workforce. This presents an exciting opportunity for TransGlobe to operate within. Addition-

ally, we are very encouraged by the leadership within the Ministry and EGPC who continue to work towards a modernization of the industry which we believe will lead to a stronger and more investible operating environment once completed.

**What is the amount of TransGlobe's 2019 allocated budget here in Egypt with reference to other countries? And how many wells do you plan to drill during the current calendar year?**

Our 2020 capital program equates to \$37.1 million (before capitalized G&A), which includes \$23.7 million for Egypt and \$13.4 million (C\$17.4 million) for Canada. This plan is strategically aimed at maximizing free cash flow to direct at future value growth opportunities in Egypt and outside of Egypt. As a result of the recent de-risking of the area we refer to as South Harmattan, we can deploy capital in Canada, to achieve our production and cash flow goals in 2020 while we await finalization of our concession consolidation efforts in the Eastern Desert in Egypt.

**What is the operational update on the South Ghazalat exploration?**

Production was initiated at South Ghazalat on 24 December 2019 from the SGZ-6X well following the installation of production facilities at site. Initial oil production was in the range of a field estimated 800-1,000 bopd, however, the gas oil ratio rapidly increased to a level that interfered with the ability to separate oil from water in the facilities. This, combined with prudent management practices on the upper Bahariya reservoir completed in this well, has led to the well now being produced at a restricted field estimated 300-400 bopd. The lower Bahariya reservoir also tested oil in this well and remains a future recompletion target. We have a rig contracted to drill both a follow-up well in the 6X discovery pool as well as an exploration well in a prospect to the East of the existing discovery later this year.

**What is the growth strategy of TransGlobe worldwide and in Egypt?**

We are primarily focused on development and production with a core view of generating strong cash flows and long-term value accretion. By steering the bulk of the company's efforts towards stable production, we have been able to create a uniquely competitive position in the market. Given our strength in maximizing recoveries from under-loved and under-developed

assets, we look to capitalize on our core skillsets to improve field rejuvenation possibilities by looking to expand our operations in Egypt or similar regions through synergistic acquisitions. Through this approach we hope to triple our production output and more importantly cash flow in the medium term. Having said that, having a little exploration success along the way is always welcome.

**Do you see your recent success in Canada having you refocus to a more Canadian centered business going forward?**

We re-entered Canada in 2016 in order to diversify our portfolio of development assets and gain exposure to the increasing technological advancements in North American drilling and completion techniques. Our Canadian re-entry was part of the Company's ongoing strategy of portfolio diversification into countries with attractive netbacks to support growth. This decision inevitably played to our core strength of value creation through development drilling and reservoir management. Recently, we have had some success in our South Harmattan area. This success provides more balance to our portfolio but we still see the real prize in the portfolio in the potential resources that could be pursued in the Eastern Desert if the Company has both the right fiscal terms and adequate time; which are the key elements of the restructuring work being discussed with EGPC.

**How will your plans change if the recent fall in oil prices turns into a prolonged return to low prices?**

We have been able to weather unpredictable markets by maintaining control over our own operations and focusing on opportunities where we can operate most efficiently. Because we are the operator of all our Egyptian assets and the majority of our Canadian assets, we can react quickly if oil prices shift materially. We're not forced to push ahead when it isn't favorable to do so and we can therefore control our costs accordingly. We believe there is potential for much stronger oil prices in the not-to-distant future and the key to success is being in a position to capitalize on those prices when they occur. We are also optimistic that the current sell-off in oil prices due to the potential for lower Chinese demand will be short lived.

**You have recently had some key people in your organization depart and have added**

**some new names, can you tell us a little about that transition?**

After a 20+ year career with TransGlobe, Mr. Lloyd Herrick retired recently; Lloyd is one of the finest individuals I have ever worked with in my career. He was truly dedicated to our shareholders, our partners and loved by our employees, he will be dearly missed. In anticipation of Lloyd's retirement, we were fortunate enough to hire Mr. Geoff Probert last spring. Mr. Probert is a highly skilled professional Engineer with over 30 years of experience, much of which in North Africa including Egypt. Geoff has already made a valuable contribution to the Company assisting in the efforts of our consolidation and in particular advancing our understanding of the contingent resource potential within the Eastern Desert lands.

**Finally, we would like to know about TransGlobe's ESG initiatives that you can share with us.**

TransGlobe has been supporting the Ras Gharib hospital for many years, as a recipient of choice as suggested by our joint venture employees. Our production assets are close to city of Ras Gharib on the Gulf of Suez and a large number of our joint venture employees live in Ras Gharib and have a strong attachment to the hospital. In 2013, TransGlobe provided support to fund the establishment of the first intensive care unit at the hospital and we continue to support the unit with donations to fund the acquisition of specialist heart and lifesaving equipment on a regular basis. TransGlobe makes donations to the hospital whenever a significant HSE achievement is reached so that we are improving safety continually as well as supporting an essential local facility in Ras Gharib.

In addition to this, TransGlobe has 2 staff members on the CSR committee, which is a subcommittee of the Egypt Oil and Gas Technical Committee. Although only recently formed, this committee is already very active in liaising with other IOC's to share and align CSR activities across the industry.

We have additional plans to decrease our emissions in the Eastern Desert which will become viable once our consolidation efforts have been concluded. We look forward to discussing these with the industry, the public and our investors once we have concluded that consolidation.

## Intelligent Strategies in LNG

By: Darrell Rangnow and Delfina Govia, Resources2 Energy

**A**bstract The vision for Intelligent Strategies in the oil industry is defined by the optimal integration of business processes and advanced technologies, supported by organizational alignment, to deliver a new standard for decision making. The greatest challenge we have all discovered is in effectively delivering the required change management, and therefore, greenfield opportunities deliver the easiest and the most rapid successes. The segment of the hydrocarbon supply chain where greenfield sites are prominent is in LNG.

Many aspects of LNG business processes and operations are unique. The paper will discuss the uniqueness of business processes stemming from LNG commercial models and the resulting requirement for tight interaction between Supply Chain and Operations, which is executed through the deployment of real-time data and information technologies.

Additionally, the paper will explore how intelligent strategies are especially significant in this industry due to the ownership structures. LNG is a highly fragmented industry, with different players in each segment of the value chain. The fragmentation is further complicated by different company stakes in assets as owners, operators, and suppliers and off takers of the LNG terminal assets. Intelligent strategies deliver the required world-class communication and collaboration capabilities.

### Introduction

Increasing supplies of stranded natural gas reserves and favorable liquefied natural gas LNG economics have been driving forces for building many new LNG liquefaction plants and receiving terminals. Globally, the LNG market has grown by 33 percent over the last five years and more than \$4 billion has been invested in that effort, according to the International Energy Agency in Paris. As favorable economics continue to drive the build-out, the deployment of intelligent strategies becomes critical to both the LNG business and as learning ground for the entire petroleum industry.

To achieve an appropriate level of granularity in describing

the multiple aspects of an intelligent strategy, we will focus this paper on a rapidly growing sector of the LNG value chain that is experiencing increasing levels of complexity: the LNG Terminal.

### The Imperative for Intelligence

LNG is a highly fragmented industry, with different players in each segment of the value chain. The fragmentation is further complicated by different company stakes in assets as owners, operators, and suppliers and off takers of the LNG terminal assets. The sixty terminals in operation are operated by over forty different companies. In the past, LNG terminals typically only served one commercial customer. The few terminals that occasionally allowed access to additional (third party) customers only did so in situations where the terminal operator substantially controlled the downstream markets and the third party users did not represent a competitive threat.

United States and European natural gas markets have become highly liquid, with commodity price transparency. As the LNG industry matures and LNG becomes a globally traded commodity, LNG terminals are forced to become more flexible and serve more customers. In some cases, these customers will be competitors. With greater flexibility, the industry will be able to increase profits through strategic plays, such as intercontinental arbitrage, seasonal storage, and peaking services. The move towards third-party-use terminals has required some rethinking of the business practices, supported by the effective deployment of intelligent strategies.

Business models and commercial agreements have been developed to accommodate various degrees of third party use. The degree of third party use has broad ramifications on the business processes, design approach and, ultimately, information system requirements. Business models vary from a pure third party use to a mixed third party and owner use. For the thirdparty-use terminals, a critical success factor of developing the intelligent strategy has been active involvement of the customers in developing the business practices for grassroots terminals and throughout the



information system design and implementation.

Business process requirements become more attenuated to accommodate third party use versus single owner operator business models. Some of the business processes impacted by third-party-use agreements are:

- Ship nominations become more important due to customer's competition for berth and storage space
- Natural gas redelivery nominations are performed in accordance with downstream pipeline nominations procedures
- Marine scheduling becomes more challenging, particularly, during weather disturbances, tidal effects, or heavy channel traffic
- Terminal scheduling becomes much more important due to the requirements to comply with the terminal use agreements and ensure equitable treatment among shippers
- Energy balance and reconciliation becomes more important in order to quickly identify losses, audit balances, and monitor ship discharge
- Customer LNG composition tracking becomes more important to ensure downstream natural gas pipeline specifications can be met for various LNG cargo qualities
- Multiple shippers sharing the same terminal require a more thorough ship monitoring and demurrage analysis

The reader can quickly see the need for real-time information and integration across business processes. Most importantly, there is a need for a tight linkage between supply chain activities, ship unloading operations, and vaporization processes.

Significant agility is needed to handle the difficult marine scheduling requirements at the terminals with multiple customers sharing the docks. Hence, the core of any intelligent strategy is an Integrated Terminal Operations System (ITIS).

## ITIS

Each ITIS project is unique due to differences in the business model, approach to business, and commercial agreements. There are, however, notable similarities among the LNG Terminals that cover the fundamental aspects of owning and operating a terminal. Fundamentally, ITIS includes two hierarchical levels: Business Systems (Supply Chain Management and Business Management) and Production Execution Systems (Operations Management and Asset Management). The Compliance Management System is shown separately because it spreads over the both hierarchical levels – it includes transactional activities, as well as execution activities. In order to achieve safety and high efficiency, all these systems must work in concert, i.e., their business processes and corresponding applications must have coordinated business targets, schedules and information interactions.

Through our work, we have defined five overarching, end-to-end business processes that collectively encompass all aspects of the LNG terminal business. These are business processes generally classified as:

- Supply Chain Management - this business process objective is to deliver reliable, transparent and timely information in one easy to use, role-based, secure portal to manage across the LNG supply chain
- Operations Management - the primary objective is to empower operations personnel with easy to use production information access, operating instructions, and alerts in order to execute the terminal schedule in the most efficient way
- Asset Management - the primary objective is to empower maintenance personnel with easy access to equipment information, maintenance order information, and alerts to ensure equipment's high availability and align maintenance work with the terminal schedule
- Compliance Management – this business process is designed to ensure constituency information needs and reporting requirements are met, with a focus on regulatory requirements.
- Business Management - provides the ability to achieve a balanced approach to meeting stakeholder needs and ensuring alignment of the business processes to those needs

Functions of the three latter business processes, Asset Management, Compliance Management and Business Management are fairly typical of a process plant with the exception of specific requirements to manage LNG Terminal's various contractual agreements and capital structures.

Asset Management business process begins with an approved maintenance schedule and budget that are coordinated with overall terminal schedule and budget. It ends with an executed maintenance schedule and replenished spare parts that are necessary to maintain equipment high availability.

Compliance Management is driven by a regulatory requirement or constituency issues that require planning and execution tracking; it ends with an executed plan or regulatory requirement being met. Typical activities include incident reporting, compliance planning and monitoring, and Management of Change (MOC).

Business Management process begins with an annual plan and budget and ends with reporting results relative to the plan and budget. Typical activities include business planning, financial accounting, human resources, contract administration, cost & capital accounting, and performance management and reporting.

The uniqueness of an LNG Terminal's business processes and ITIS functionality stem from unique supply chain's commercial model and tight interactions between Supply Chain and Operations. These business processes are described in more detail in the following sub-sections on Supply Chain and Operations Management, with special

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notes to the reader to understand that intelligent strategy for LNG requires integration across the chain.

### Supply Chain Management

The business process begins with an Annual “Customer LNG Receipt Schedule” and ends with meeting daily send-out commitments on a physical basis. On a financial basis the process ends with a paid invoice by the customer to LNG

**Terminal. The business process objectives are:**

- Ensure the LNG terminal’s full contribution to the customer’s LNG supply chain
- Meet receipts and send-out delivery commitments with timely reporting of receipts and send-outs.
- Manage terminal services while meeting natural gas send-out specifications
- Quickly respond to schedule changes due to unplanned events
- Manage supply costs, including demurrage and losses

**The primary activities included in this process are:**

- Customer nominations
- Terminal scheduling
- Cargo tracking
- Energy balances

Other supply chain activities may include contract administration, mooring and piloting, and demurrage claims management.

### Customer Nominations

Customer nomination is the primary supply chain customer-facing activity. This application coordinates all ship and natural gas redelivery nominations and confirmations with the customer. Based on the terms in the contract, nominations can be for the ship only, or for both ships and natural gas redeliveries. Customer nominations manage the creation of the Annual Delivery Program which are customer specific and defined in the terminal use agreements. Once the annual program is developed, typically there are rolling three month updates to the annual program. The monthly updates, once accepted, take precedence over the annual program. During the annual and monthly nomination cycles, the customers’ nominations are displayed, and in some cases available ship unloading windows are also displayed.

On a daily basis, records are published to the customers that contain basis information such that the customer can nominate the next day natural gas redeliveries. For an unplanned event, such as a weather disturbance or ship delays, the customer nomination application receives and manages any customer requests to change ship arrival dates. All notifications, nominations, and confirmations are tracked for commercial purposes in the application. This application is tightly integrated with terminal scheduling. Embedded in the application are checks to ensure the customer is in

compliance within their contractual limits.

### Terminal Scheduling

A critical activity, terminal scheduling integrates customer nomination with operations to produce a feasible schedule that meets the customer needs. Terminal scheduling determines schedule feasibility, analyzes various alternatives, and develops the best feasible terminal schedule. Once the schedule is developed, key parameters are passed from the schedule to the Operations Execution and Ship Unloading applications for execution.

The terminal schedulers collect schedule baseline information from various information sources to establish the current state of the terminal operations. The most current ship and gas redelivery nominations are imported into the application and analyzed to ensure feasibility of ship unloading, storage, and redelivery capability. The scheduling application also is used to evaluate the impact of terminal services unavailability, weather disturbances, or ship delays.

### Cargo Tracking

Cargo tracking coordinates and tracks LNG cargoes from the time of the annual LNG Receipt schedule until the ship’s cargo is discharged and the ship is sailing. The activity ensures compliance with the terminal use agreement terms with respect to ship nominations, scheduling, and discharge. Cargo tracking is used to manage ship departure notices throughout the voyage, capture cargo information, manage channel transits from the sea buoy to the dock, collect cargo unloading information, and ship positions throughout channel transit. Cargo tracking collects all information associated with a cargo life cycle, such as nominations, notifications, cargo quality, and ship discharge events and performance.

### Energy Balance

The energy balance application provides reconciled, auditable information for the purposes of managing inventory and custody transfers and identifies sources of unreported losses and meter errors. Energy balance receives information from all the flow meters, tank inventory levels, and ship discharge reports to develop reconciled gross heating value energy balances.

**The energy balance performs the following functions:**

- Provides capability for near real time monitoring of terminal inventory of volume, mass and calorific basis
- Develops reconciled energy balances based on redundant measurements for various energy envelopes including ship to LNG tank, LNG tank to vaporizer, vaporizer to custody meters and cavern gas withdrawals/(injections)
- Reviews balance inquiries and make adjustments as

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necessary to historical balances

- Identifies faulty meters and real sources of losses
- Performs various ad hoc analysis such as ship discharges, process performance, and tank compositions

The energy balance manages prior period adjustments for the purposes of custody transfers. It forms the basis of daily inventory positions and tank compositions, sendout custody transfers, fuel usage monitoring and ship discharge validations.

## Operations Management

Operations Management begins with an approved terminal schedule and ends with an executed daily schedule. The **business process objectives are:**

- Meet receipts and send-out delivery commitments and timely unloading of ships
- Provide safe, flexible operations to comply with terminal schedule
- Ensure high level of operational readiness and efficiency
- Communicate terminal status and condition
- Control operating costs

**The primary activities included in Operations Management are:**

- Operations execution
- Sample records management
- Ship unloading
- Production performance Operations Execution

This activity provides operations personnel with visibility into critical information to empower the operations. It complements process control capabilities by automating and expanding the traditional logbook functions.

The operations manager receives the daily terminal schedule and create daily targets and operating orders. Operators receive daily operating targets and operating orders from the logbook. As work is progressed, the operators update the order status and enter comments into the logbook.

Operations personnel also have visibility into technical information, such as equipment drawings, process & instrumentation drawings, control system conditions and alerts, and operating and maintenance procedures. Operations management has access to the logbook from remote locations to assess current operations and maintenance status and issues.

**Typical functions of the activity are:**

- Translate schedule into daily operating targets and orders
- Approve operating and ship unloading orders
- Execute operating orders
- Update operating order status
- Monitor equipment, sendout and compliance alerts
- Enter logbook comments required during operating orders execution
- Update work order status and inspection prior to placing in equipment in service

- Enter remote readings and observations
- Monitor inspection rounds and routine tasks

Operations Execution assists in managing the scheduled operating tasks performed by operations personnel. The activity complements process control systems by providing necessary tools to communicate the tasks to the operators and log execution results to ensure timely actions and to collect information for operations performance analysis.

## Sample Records Management

Sample Records Management provides the capability to electronically manage records of manually collected samples. The scope of this activity typically includes gas sample records from the unloaded ships and environmental sample records (air and water).

**Sample Records Management functions include:**

- Manage sample retention storage as specified in terminal use agreements
- Record sample retention requests and issue samples as specified in terminal use agreements
- Monitor sample container retention aging
- Return sample containers to use after storage
- Record environmental sample quality results
- Historize sample records

Sample Records Management is specific to LNG Terminals due to special conditions stated in Terminal Use Agreements (TUA) for the gas samples handling and dispute resolution. The activity also helps effectively managing sample containers and third-party labs.

## Ship Unloading

The objective of the activity is to enable proper management of ship unloading operations by automating the operating tasks and user-system interactions. This activity is critical for LNG Terminals since it generates custody transfer data and actual unloading time log that are used by Supply Chain to calculate customer storage positions and demurrage charges are collected and generated by this activity. Ship unloading is an important integration point with the Supply Chain activities.

Integration is achieved in both directions: 1) From Supply Chain to Operations - through terminal scheduling, which coordinates ship unloading operations with vaporization operations and passes the unloading targets to operations, and 2) From Operations to Supply Chain – through reporting of actual ship unloading results.

**The Ship Unloading functions are:**

- Translate daily schedule into daily unloading targets and orders
- Generate Ship Unloading Report



- Generate Ship Unloading Time Log Report
  - Capture key ship unloading timestamps and events
- Ship Unloading provides necessary tools for managing the scheduled ship unloading tasks performed by operations personnel. The activity complements Process Control Systems by communicating the tasks to the operators and reporting execution results to Supply Chain activities.

## Production Performance

This activity provides operations personnel and process engineers with information required to monitor production performance so that they can diagnose and fix process problems in a timely fashion.

### The main functions are:

- Analyze process performance and calculate process efficiency
- Identify root causes of process under-performance or equipment failures
- Set thresholds for process alerts
- Modify operational procedures and process conditions as necessary

All the above functions use real-time production data stored in the Plant Historian, which is considered typically as a part of the activity. Production Performance Management monitors production processes and provides operations personnel with analytical data leading to further performance improvements.

As stated earlier, the design of the underlying systems that support an intelligent strategy are only designed after the business processes are well defined with the critical input of the owners and operators. This drastically reduces the change management issues that are normally associated with the “retrofit” of existing operations, and allows for the realization of significant results.

## Results

Throughout the paper we have shared the various business objectives of the business processes that an intelligent strategy supports. The results of those successfully deployed **intelligent strategies in this space include:**

- Integration of all functions across the business
- Construction of robust business processes
- Greater agility in decisions
- Lowest possible capital and operating costs
- Higher performance
- Maximized operational flexibility

Naturally, embedding intelligence into an LNG terminal design impacts the direct terminal plant investment capital costs.

Direct plant investment cost for an LNG terminal range from \$500 million to \$1 billion per BCF per Day of send-out capacity for a United States Gulf Coast terminal.

### Factors affecting direct plant capital investment are:

- Plant size economies
  - Process configuration and automation
  - Location
  - Advanced technologies (such as sensors, wireless infrastructure, visualization tools, and collaboration tools)
- These design considerations can dramatically affect direct invested capital. The added cost of an intelligent infrastructure, including hardware and software, can range from 1.5% to 3%.

The benefits, however, are realized in a potential 15 - 30% reduction of terminal operating expenses. The expense categories that are most significantly impacted are staffing costs and maintenance costs.

Typical plant and overhead staffing costs is about \$10 million per year, which includes operator, maintenance, plant administration, and corporate overhead. Case studies have shown a 20 - 30% employee/contractor productivity benefits with the integration of business processes, information systems and advanced technologies.

The benefits to maintenance costs, however, have fallen across a wider range depending on the key performance indicator in question. Response time for addressing maintenance issues, for example, ranges from 25 - 80% reduction. Completion or turnaround time on maintenance issues has shown reductions ranging from 15 - 30%, and spare parts inventory has shown reductions ranging from 20 - 50%.

Integrating the nominations, terminal scheduling, and ship unloading business processes results in a 10 percent reduction in ship demurrage by better scheduling arrivals. For a typical terminal receiving 130 ships per year (1BCF), the savings in demurrage are about \$2 million per year.

Fuel and losses are reduced by 0.1 to 0.3 percent, for a 1 BCF terminal, this represents an annual savings of \$2 to 6 million per year.

## Conclusions

The complexity of today’s modern terminal operations and the speed to which this segment of the LNG value chain is growing, essentially demand the deployment of intelligent strategies. Fortunately, greenfield sites allow for the proper design of business processes from the outset with the appropriate level of involvement of the multiple stakeholders in the process.

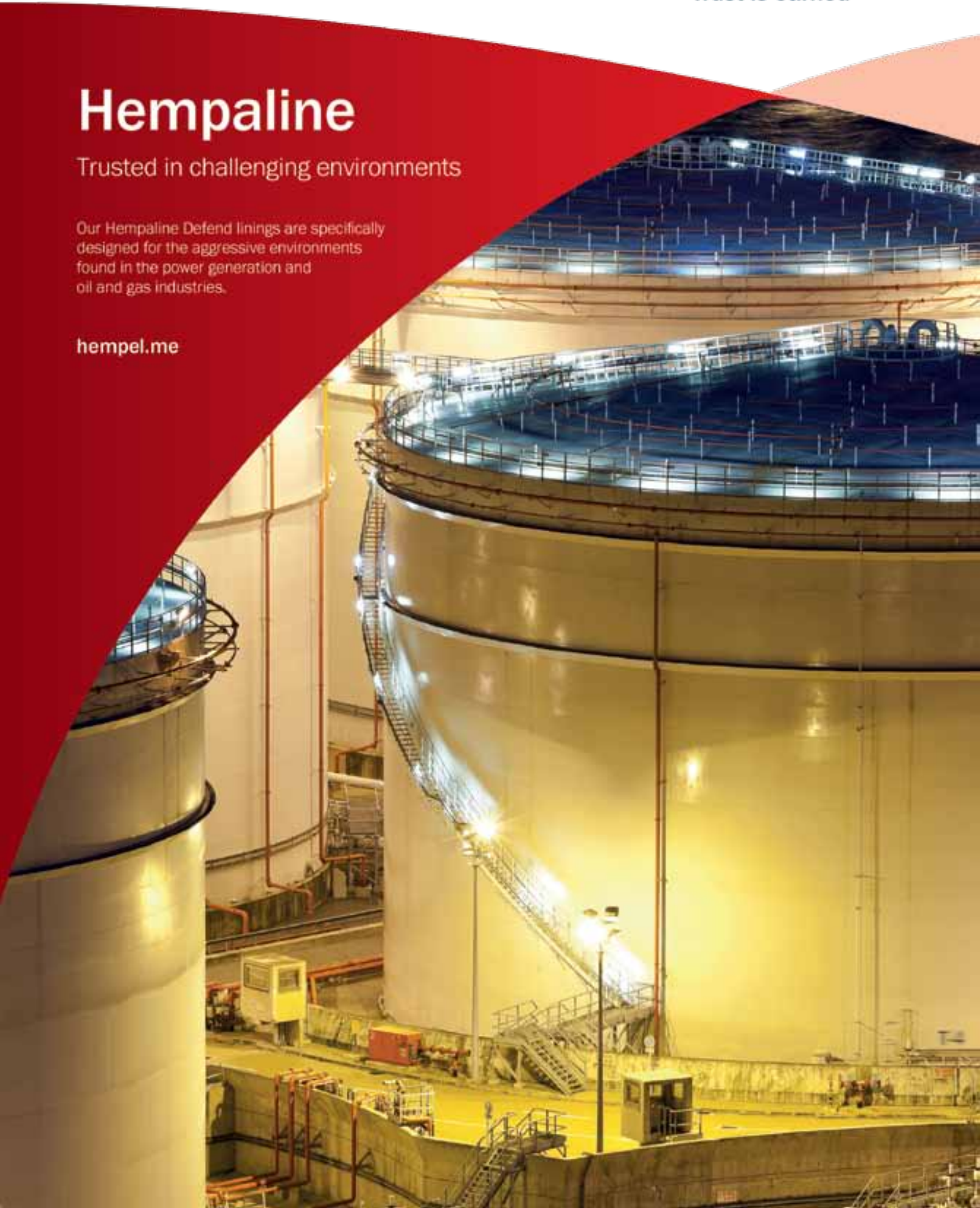
This drastically effects the successful adoption of new ways of operating so that intelligent models can become the accepted norm. As the number of new sophisticated terminals increase, the examples of successful case studies in intelligent strategies will increase, and hopefully provide wider acceptance across the entire petroleum industry.

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# Applying Project Management Techniques to a Record-Breaking Ultra-Deepwater Frontier Drilling Operation

**By:** Carlos Eduardo Nunes, Newpark Drilling Fluids Brazil; Vance Smith and Ahmed Amer, Newpark Drilling Fluids LLC; Diogo Wink Tourinho, Newpark Drilling Fluids Brazil

**A**bstract This paper highlights the use of integrated project management techniques, as well as innovative drilling fluids technology, to safely achieve drilling objectives on a frontier exploratory, ultra-deepwater project offshore Uruguay. Drilling in a frontier offshore area adds layers of complexity due to inherent uncertainties and risks associated with these types of operations. The use of project management techniques, combined with application of novel drilling fluids technologies, served to mitigate and reduce project risks.

Preparation for this well included regulatory review and HSE compliance procedures, facilities and logistics planning, the operator's understanding of the well complexities, selection of experts for each aspect of the operation, and contingency planning to include displacement and emergency disconnect. A thorough and comprehensive readiness review, coupled with communications processes, reinforced the project management loop. Critical path management and efficiencies of drilling operations dictated managing the logistics of mixing large volumes of drilling fluid at multiple locations. The well design program considered the possibility of encountering extreme sediment compaction arising from mass transport complexes (MTC) in the riserless interval. MTCs are a recognized geologic phenomenon and are typically avoided when drilling in deepwater areas of the world.<sup>1</sup> The novelty of the workflow involved in safely and effectively delivering this record, frontier ultra-deepwater well included thorough planning and execution, in parallel with the use of new drilling fluid technology and facilities.

## Introduction

Drilling in deep water environments presents the potential for a variety of operational problems. Wellbore stability,

rates-of-penetration (ROP) and pressure management are deepwater operational challenges, and these are exacerbated in ultra-deepwater wells. The inability to control these drilling challenges can result in catastrophic events, which negatively impact operating costs and potentially compromise safety, the environment and project economics. The ideal drilling fluid for deepwater operations is one that satisfies all technical, performance and environmental goals, while also managing costs and non-productive time.

Operations on this record ultra-deepwater well were conducted in a remote frontier area, placing greater importance on thorough pre-well planning and execution to minimize risks. The drilling campaign occurred in an area without an established oil and gas industry, facilities or an infrastructure to support ultra-deepwater drilling programs. Additionally, the well was to be drilled at a water depth approaching the operational limits of the drillship. The drilling fluids service company mobilized and safely installed an offshore supply base equipped with a liquid mud plant (LMP), bulk facilities, a full service laboratory and raw materials for drilling fluids used in the well construction process. Some assets were manufactured locally, while others were deployed from facilities in the Gulf of Mexico, Europe and Brazil. All assets were safely installed and commissioned at the offshore base in Uruguay in a relatively short time frame, and before commencement of drilling operations. The onsite laboratory was staffed with technicians capable of performing a full suite of testing in support of offshore operations and in accordance with API RP 13B1 and API RP 13B2 procedures.

The drilling fluids team used integrated project management techniques in order to safely accomplish all tasks in compliance with the operator's timeline and objectives. Given the inherent uncertainty of frontier operations, combined with a relatively short window to mobilize, install and commission the assets before startup of drilling



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operations, a rigorous and disciplined approach was used to achieve all project objectives.

A key tactic used included the placement of two (2) project managers, having technical and operational experience in deepwater operations in remote locations, to ensure project success. Additionally, two critical paths were identified and integrated into a multi-disciplinary approach for placement of infrastructure (LMP and bulk facilities), and for the selection and use of robust drilling fluid systems designed for ultra-deepwater wells. Given the highly strategic nature of this drilling program, sponsors with corporate authority were employed as a means to drive visibility and commitment to the project. A management of change (MOC) process was used to drive the cultural behavior and approach of the multi-national and multi-disciplinary team.

### Project Management

Design for Manufacturing (DFM) concepts address key issues in the design and construction of best-in-class liquid mud plants. These concepts include process automation for precise repeatability, Lean principles for eliminating waste, and Six Sigma tools for reduced variability. In addition, Lean and automation emphasize safety as well as speed of service. Finally, key performance metrics are suggested for measuring the efficiency of the LMP design. The LMP design objective focuses on process efficiency, which includes increasing capacity, improving functionality, eliminating waste and reducing process variability.

The application of project management techniques was particularly important in this drilling campaign, in an area without an established infrastructure or a material number of offset wells. A critical path and risk analysis was conducted to identify pathways to navigate through areas of uncertainty and to manage risks inherent to projects of this nature. A Voice of the Customer (VOC) process was used with the operator to identify and rationalize requirements and capabilities of facility assets on the offshore base following award of the contract. A process known as Value Stream Mapping (VSM) was used to identify critical paths on several tasks of the chronogram which were identified as key areas of risk and attention. This allowed the team to apply Design for Manufacturing (DFM) concepts to address issues during the construction phase of the facility, and while manufacturing drilling fluids at the liquid mud plant (LMP). A communications program was implemented to ensure visibility and clarity of key roles and responsibilities for team members.

A risk analysis was performed for each item and a critical path developed in order to observe the impact on items identified on the VSM. Risks inherent to each activity were identified and a mitigation program was developed and

implemented. Lastly, activities were identified which could be conducted in parallel to drive further efficiencies in the facility construction process.

A key decision in the use of project management is to identify and mitigate project-related risks. Risks referred to as «above-ground risks» are often straightforward, and can be managed with well-known and understood mitigation measures.<sup>3</sup> However, drilling projects in frontier markets are often characterized as having complex above-ground risks, which include:

- Policy and regulatory uncertainties
- Managing community expectations
- Lack of established supply chain
- Transparency in local partners
- Mitigation measures

Project management techniques were used in the planning and management of the project with consideration to these risks. A global, multi-disciplinary team of drilling fluid technical and operational professionals was mobilized and deployed to ensure successful and timely completion of the well. This team had experience in deepwater projects in Brazil and the Gulf of Mexico. The breadth and depth of experience of this team included over 300 deepwater & ultra-deepwater wells, a number of which were in ultra-deepwater, frontier markets and at water depths above 2,500 meters (8,200 feet). This team was also familiar with the application of novel drilling fluids solutions to mitigate risks inherent to these types of wells. Language was recognized as a potential barrier with the local labor force and this was addressed by staffing the project management team with members having fluency in Spanish. Additionally, the team on the ground was familiar with the local Mercosur Common nomenclatures, as well as the local administrative and taxation process. Being in a frontier location, Uruguay lacked a mature regulatory structure for the oil & gas industry, and extra care was required to ensure compliance with regulatory requirements that were not fully developed when the project began. Lastly, the project management team was experienced and knowledgeable in supplier approval and management in support of the operation.

A project kick off meeting was held with the operator to outline the project plan, workflow, key deliverables and timelines. Key decisions and outcomes of the meeting included:

- Initiation of civil work on foundation for placement of the LMP facility roughly six (6) months prior to spudding of the well
- Implementation of Health, Safety and Environment (HSE) procedures, training and competency programs for

all personnel involved in the civil work and construction process

- Submission of documents and procedures to local authorities to ensure regulatory compliance
- Use of scenario planning to rationalize raw materials used for preparation of drilling fluids while seeking final regulatory approval
- Use of scenario planning for base oil selection during the environmental regulatory approval process

Figure 1 shows the progression of the LMP design following use of Voice of the Customer (VOC) and Design for Manufacturing (DFM) principles with the customer and contractor on the project. Additional elements of the project management plan were implemented to address challenges inherent to initiation of a scope of work in a new, frontier country. On the administrative side, this included securing a legal entity and company registration. Additionally, research of local labor laws was conducted to understand entry requirements for project management personnel (expatriates), and to ensure regulatory compliance. Lastly, inter-company agreements were established to allow for initiation of back up plans for assets, materials and personnel as required.

The project management team was also tasked with management of the supply chain for all materials required to support the project. This included identifying and approving all suppliers of products, goods and services in support of the drilling campaign. Due to the location of the offshore supply base and distances from the Gulf of Mexico or Brazil, lead times for shipment of materials were identified as an area requiring attention, oversight and control. A process was implemented to provide forecast estimates of key materials, and lead times for each were identified and included in the supply chain program. Finally, all specific requirements for international transactions for products targeted for use were identified, and the appropriate controls were implemented.

Lastly, the quality system of the drilling fluid company was replicated to Uruguay, and all management and operational procedures were adapted and implemented in the project workflow. This allowed for timely and accurate responses to local authorities, particularly when documentation was required in the licensing process, and when communicating with local authorities. Additionally, quality control and assurance activities for all drilling fluid products were managed in accordance with company QC/QA procedures at support laboratories in Macae and Houston.

## Facilities

A key enabler in the drilling fluids value chain is facility placement, capability and capacity. Operators leverage

best-in-class facilities, distribution and logistics to improve project efficiencies and economics.

Understanding the logistical and operational challenges associated with deepwater projects, the drilling fluids supplier invested in an offshore supply base in Montevideo, Uruguay to address the deliverability requirements for the ultra-deepwater campaign. The supply base was designed to manufacture and safely offload large volumes of drilling fluids and bulk materials to supply vessels, at rates surpassing the operator's expectations.

The location for placement of the offshore base was cleared by local regulatory authorities in order to begin civil work less than 3 months prior to the planned date to spud the well. As per the risk analysis performed during the planning stages, civil work was identified as a critical path, so a series of actions were taken to mitigate risks. Designs considering various types of equipment and area configurations were developed by the engineering team. Each one was carefully analyzed in order to run average and worst case scenarios for foundation design.

Key deliverables of the project management program included safe and compliant construction of the liquid mud plant (LMP) and bulk material plants at the offshore supply base from which offshore activities would be supported. This required designing and installing an LMP with sufficient capacity for waterbased muds (WBM), as well as the flat-rheology, non-aqueous fluid (FR-NAF). The combined capacity of these two facilities was over 20,000 bbls, and with roughly 14,500 dedicated to the FR-NAF. The design also addressed the distance from the LMP to the designated pier, and the need to transfer drilling fluids at distances over 100 meters to an offshore supply vessel. Additionally, the design workflow of mixing hoppers, valves, mixing and shearing systems significantly reduced mixing times and improved the quality control of the fluid preparation process. These mixing and shearing techniques, along with reconfigured piping and pump arrangements, allowed for parallel processing and advances in both lead time and service capacity. The mixing and storage tanks were designed to minimize dead volumes and to facilitate achievement of HSE objectives during loading and offloading operations. Load rates for both liquid and bulk materials to offshore supply vessels met or exceeded operator requirements. Lastly, the LMP was designed with the ability to operate stand-alone, and to be independent of electrical (power) support from the port authority power supply.

The bulk facility was also designed to convey bulk materials at distances of over 100 meters to an offshore supply vessel, and had storage capacity for over 300 MT of barite and 50

MT of calcium carbonate. The facility was equipped to filter and capture particulates from materials pumped from the bulk plant to the supply vessel. Additionally, the bulk plant was equipped with dust collectors to minimize particulates within the pneumatic system. The bulk facility was also designed to operate stand-alone from the port authority power supply. Figure 2 - 5 show the liquid mud and bulk plants which were completed on schedule and in accordance with the project plan, as an outcome of the use of project management techniques.

## Drilling Fluids

A unique fluid selection and delivery process was used to meet all operational and logistical goals, in compliance with local environmental regulations, and to satisfy the significant technical and operational objectives of this challenging deepwater well. Two innovative fluid systems were used to achieve all operational objectives. An inhibitive, aqueous fluid was used to facilitate delivery of drilling, casing running and cementing objectives in the riserless interval. This fluids was chosen based on prior use in offshore Northeast Brazil, where the system provided excellent wellbore stability when drilling the highly reactive and unconsolidated Calumbi shale. This system was also considered to be an appropriate solution for the control of problematic sediments arising from mass transport complexes (MTC). The riserless interval was successfully drilled and a pad mud was placed in the open hole to provide wellbore stability during casing running and cementing operations.

Deepwater drilling fluid design challenges are exacerbated by the operational environment encountered in the drilling process. Pressure control is particularly important in deepwater operations, where a narrow operating window exists between the pore pressure and the fracture gradient. These narrow margin wells are abnormally pressured and the design characteristics of drilling fluids for deepwater wells are unique, and can differ significantly compared to normally pressured wells. The cooling effects of the water column opposite the riser creates a negative geothermal gradient, where static temperatures are often reduced to as low as 1°C (34°F) at the seafloor. The geothermal gradient then increases with increasing depth, and bottom-hole static temperatures increase to levels often above 150°C (300°F). Increasingly, the fluids-of-choice for deepwater, and ultra-deepwater operations are non-aqueous fluids (NAF), designed to exhibit a flat (constant) rheological profile which is nearly independent of downhole temperature and pressure conditions.<sup>4,5,6,7,8</sup>

The potential for formation of gas hydrates is a well-recognized hazard due to the high pressure and low temperature conditions at the seafloor.<sup>9</sup> Testing and modeling

techniques were used in the pre-well planning phase of this well to predict the potential for gas hydrate formation. Due to the expected pressure and temperature conditions on this well, the risks associated with use of an aqueous drilling fluid were deemed significant and the decision was made to drill the well with a non-aqueous fluid (NAF). Following a rigorous qualification program, the decision was made to use a new and innovative flat-rheology, nonaqueous fluid (FR-NAF). The use and relevance of a FR-NAF was particularly important given that the well of interest was a record in terms of water depth, which was in excess of 3,400 meters (11,152 feet). Robust fluid formulations were designed using novel and proprietary emulsifiers, rheological modifiers, suspension agents and fluid loss additives. Variations in rheological properties such as plastic viscosity, yield point, as well as viscometer dial readings of 3 rpm and 6 rpm and gel strengths, were minimized to safely achieve drilling, tripping and casing running objectives without incidents of fluid-related NPT. Table 1 shows the formulation of the FR-NAF designed for use in this well and the near-independence of temperature and pressure on the flow properties and gel strengths of the fluid. Figure 6 presents these results in graphical form and one can clearly see that API yield point, as well as the gel strength measurements (10s, 10m & 30m) are nearly flat (constant) with changing temperature and pressure conditions.

An important drilling fluid design consideration is to minimize filtrate invasion to the porous rock matrix in order to reduce the risk of stuck pipe, downhole losses, formation damage and excessive filter cake.<sup>10</sup>

A proprietary, internal software program was used to identify the appropriate bridging additives for this well, using the Ideal Packing Theory (IPT), as shown in Figure 7. This approach was used to formulate an engineered bridging solution, designed to seal pore fractures between 100 - 200 microns, which was used to eliminate downhole mud losses.

## Results, Conclusions and Lessons Learned

Use of novel, deepwater drilling fluid solutions allowed for achievement of all drilling objectives in this record ultra-deepwater well. All planned operational objectives were safely achieved in accordance to the project plan. Risks identified in the riserless interval included the potential for encountering mass transport complexes (MTCs), compacted sediment deposits that often creep, slide and slump into one another. This risk was identified in the well planning process and appropriate controls were put into place to mitigate the risk through a rigorous drilling fluid selection process. Additional risks associated with pressure management and lost circulation were also identified due to the large variations in downhole temperature and pressures



inherent to ultra-deepwater operations. Fluid properties were maintained within specifications throughout the drilling of this well and novel techniques, including use of a meter to measure the activity of the internal phase, were employed to manage properties within specification. A rigorous analysis of expected downhole temperatures and pressures was conducted in the pre-well planning process using sophisticated hydraulics software. The technical solutions proposed, coupled with detailed planning, allowed the operator to stay within planned days despite having to displace the riser to a completion brine on numerous occasions in anticipation of poor weather conditions. Figure 8 presents a comparison of planned versus actual drilling days and a demonstration of the operational performance of the FR-NAF, as well as the execution capability of the offshore and onshore operational personnel.

This engineered approach facilitated delivery of drilling objectives without incidents of fluids-related non-productive time (NPT). Additionally, all logistical objectives were achieved on time, and in an environmentally compliant manner. All fluid volumes were safely prepared and delivered to the 7<sup>th</sup> generation drill ship without incident. The ability to quickly mobilize and deploy assets, as well as experienced, multi-functional and multi-nation team of drilling fluids professionals, greatly impacted the success of this project.

#### Notable milestones from this project included:

- Excellent safety record, with no recordable incidents in the construction process or in support of the drilling operation
- 5,032 bbl (800m<sup>3</sup>) WBM facility operational in ~ 60 days, including commissioning
- 849 bbl (135m<sup>3</sup>) bulk facility operational in ~ 60 days, including commissioning
- 14,467 bbl (2,300m<sup>3</sup>) FR-NAF facility operational in ~ 75 days, including commissioning
- Timeframe between receiving permit to start civil work and delivering area back to Port Authority with civil work removed, back to original state within 11 months
- Project achieved local content objectives
- Successfully completed riserless interval, conductor and ran and cemented casing (through MTC formation)
- Successfully drilled the well without incidents of fluids-related NPT
- Project was completed on time and within planned cost

## Conclusions

- Project management techniques were instrumental in delivering operational success of a record ultra-deepwater well, offshore Uruguay

- Operations on this record ultra-deepwater well were conducted in a remote frontier area, placing great importance on thorough pre-well planning and flawless execution to minimize risks
- A key enabler in the drilling fluids value chain is facility placement, capability and capacity
- The novelty of the workflow involved thorough planning and execution, in parallel with the use of new and innovative drilling fluid technology and facilities
- A Voice of the Customer (VOC) process aided in identifying and rationalizing requirements
- The use of new and innovative drilling fluids delivered significant gains in operational performance

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## Nomenclature

MTC	Mass transport complexes
ROP	rate of penetration
LMP	liquid mud plant
bbls	oilfield barrel, 42-gallons
m <sup>3</sup>	cubic meters
NPT	non-productive time, hours
VOC	voice of the customer
VSM	value stream mapping
DFM	design for manufacturing
HSE	health, safety and environmental
WBM	water-based mud
MT	metric tons
NAF	non-aqueous fluid
FR-NAF	flat rheology, non-aqueous fluid
QC/QA	quality control/quality assurance
C	Temperature, Celsius
F	Temperature, Fahrenheit
10s	10 second gel strength
10m	10 minute gel strength
30m	30 minute gel strength

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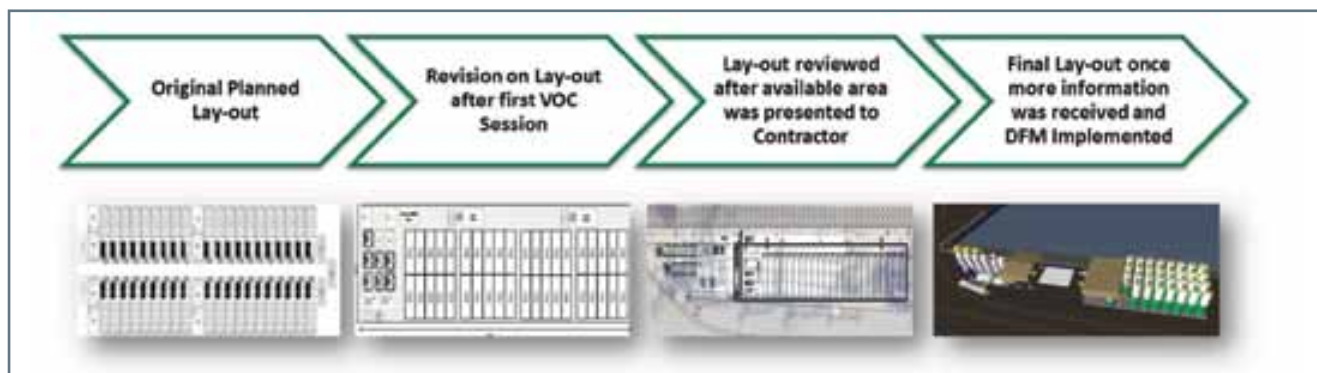


Figure 1—Progression of layout of offshore base following project management



Figure 2—Tank positioning (LMP)



Figure 4—Exterior of liquid mud plant (LMP)



Figure 3—Mixing equipment & tanks (LMP)



Figure 5—Bulk materials plant

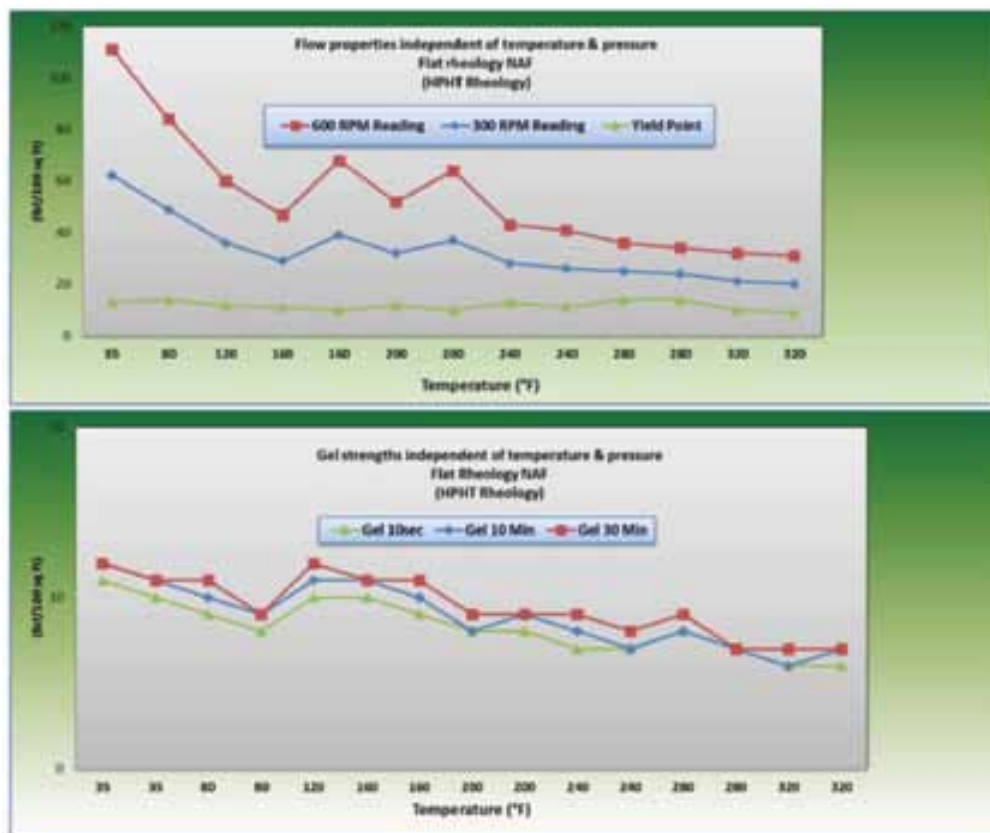


Figure 6—HPHT Flow Properties of FR-NAF

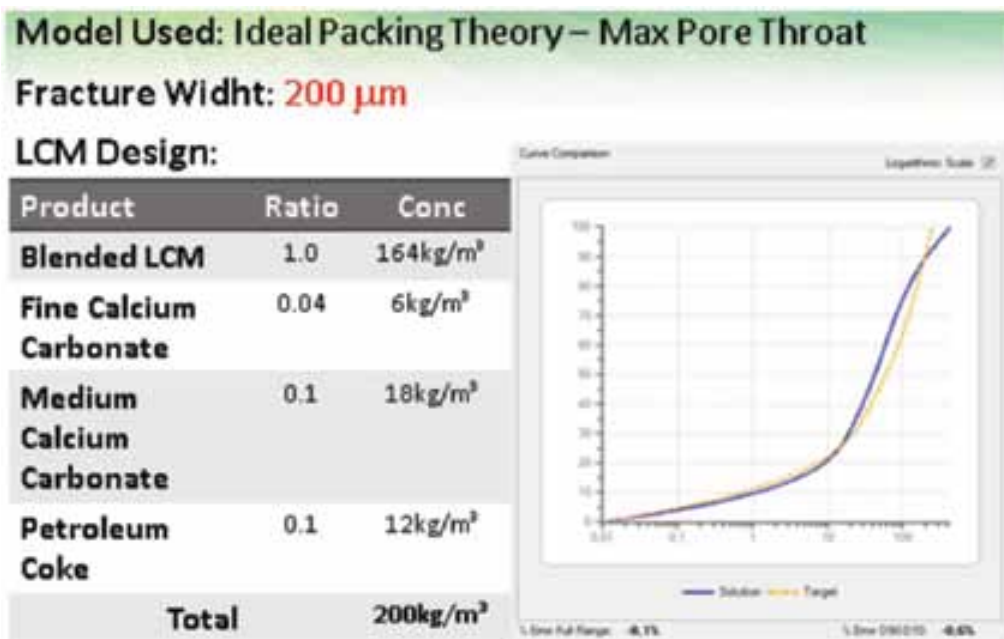


Figure 7—Bridging design for FR-NAF



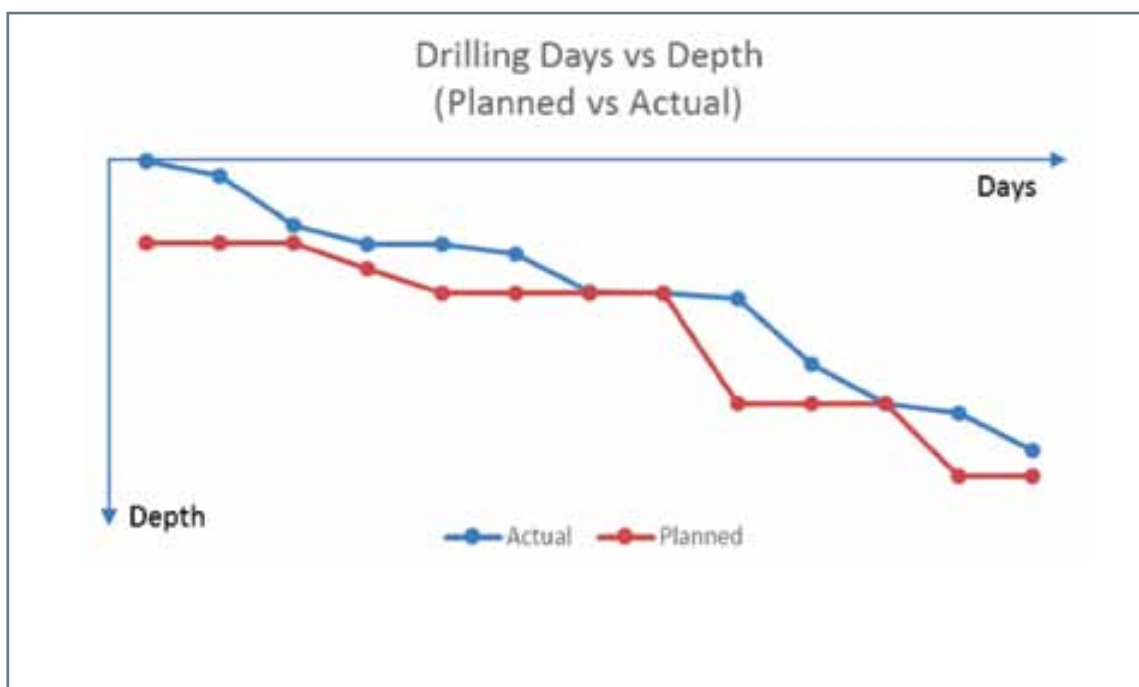


Figure 8—Drilling Days vs Depth for Well (Plan vs Actual)

Table 1—HPHT Flow Properties of FR-NAF

Test Conditions		RPM Readings @						Plastic Viscosity (cP)	Yield Point (lb/100 sq ft)
Temp (°F)	Pressure (psi)	600	300	200	100	6	3		
35	5,500	111	62	44	33	9	8	49	13
80	5,500	84	49	34	26	10	9	35	14
120	5,500	60	36	24	17	9	8	24	12
160	5,500	47	29	22	16	8	8	18	11
160	10,000	68	39	29	21	9	8	29	10
200	10,000	52	32	23	17	9	9	20	12
200	13,000	64	37	29	20	10	9	27	10
240	10,000	43	28	22	16	8	8	15	13
240	13,000	41	26	20	14	8	7	15	11
280	10,000	36	25	18	14	9	8	11	14
280	13,000	34	24	17	15	8	7	10	14
320	10,000	32	21	16	14	7	6	11	10
320	13,000	31	20	14	11	7	7	11	9

## Extracting the Last Molecule of NGLs GASCO L.P Model Experience

By: Arvind Ramachandran, GASCO Abu Dhabi Gas Industries Ltd

**A**bstract  
An ADNOC operating company, GASCO is one of the world's largest natural and associated gas processing companies, with a processing capacity of 8 billion cubic feet of feed gas per day. Processing associated and non-associated gas, GASCO operates 3 desert plants for gas processing and natural gas liquids (NGL) extraction, a Natural Gas Liquids Fractionation facility and a pipeline distribution network.

GASCO plays a strategic role in the ADNOC and UAE hydrocarbon chain, which makes it a vital enabler of industrial and economic progress of UAE. Gas yields substantial revenues from exports and is key for the country's electricity generation and water desalination. In a carbon constrained world, interest in its use is growing rapidly by all users, whether residential, commercial or industrial.

As GASCO delivers on its responsibility as an economical and sustainable supplier of gas and related products, it seeks to drive operational excellence by focusing on people, performance, profitability and efficiency.

The GASCO schematic is presented below for your reference.

*The complexity of GASCO operations can be easily visualized from the schematic presented above.*

*Especially, the fact that some on-shore and off-shore feed-streams received can be processed at several processing trains that differ in plant yields, energy consumptions and differ in their operating constraints.*

*The product prices also differ from month to month.*

*This complexity and closely inter-twined processing trains with up-stream oil production facilities give rise to the following typical challenges routinely faced by GASCO planning team:*

■ **Long-term shut-down planning and alignment with**

**other ADNOC operating companies and consumers**

– It is very important to ensure that GASCO in all ways possible ensure that it causes no impact on upstream oil production or down-stream feedstock availabilities. At the same time, GASCO needs to plan and leverage any planned shutdowns at up-stream or downstream to utilize any opportunity windows to execute its own shutdown activities.

■ **Optimal utilization of available assets during normal operating days as well as during planned shutdowns**

– GASCO internally has many opportunities to optimize its feed allocation to its different processing trains thereby ensuring that the optimum production plan is prepared both in times of normal operational days as well as during periods when there are planned shutdowns of some GASCO trains.

■ **Tracking opportunities on a daily basis – quantification of the opportunity and timely corrective actions**

– On a day-to-day basis, it is very important that Operations team knows what opportunities were lost the previous day or previous week and what corrective measures can be implemented. An advanced simulation is needed to advise operations where the big opportunities are at a GASCO complex level not just at individual plant level.

■ **Changing feeds from up-stream reservoirs – feed rates and compositions**

– On a weekly to monthly basis, it is very important that Operations team knows what is likely to be the operating constraints, feed compositions and feed rates from upstream and how to best operate the units at GASCO complex level.

**In short, the challenge is «How to formulate an optimum production plan, execute it and drive plant operations to extract every molecule of valuable NGLs»?**

GASCO already has rigorous first-principle process models of each process unit individually. However, there was no

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integrated model at the GASCO complex level that could be used for production planning purposes. In order to address the above challenge, GASCO built and deployed a company-wide integrated planning model to systematically prepare optimum monthly production plans. The GASCO integrated planning model is based on Linear Programming (or LP model in short). It comprises of sub-models representing each site. The integrated model is used to produce company-wide monthly optimal production plans.

Initially, the model was developed by GASCO's Habshan site as a proof of concept. It is worth noting that Habshan plant is among the most complex gas processing facilities in the world with a wide variety in feedstocks allowing a great range of operational modes possible. The optimum way to handle a given set of feeds on each day giving the unique constraints is not only a planning challenge but also an operational challenge. Therefore, building the Habshan site LP model (Linear Programming based mathematical model) was a very complex and challenging task. The idea was to start simple and add complexity and details as needed what is known in industry as Progressive Elaboration.

Since the implementation was very successful, the model soon became an integral part of the monthly planning cycle at Habshan site. It helped operation engineers at Habshan to identify the best way to operate the Habshan trains. The one big advantage that was immediately realized is that daily lost opportunity could be quantified in monetary terms and hence the real impact of daily operations could be reported and monitored.

Eventually, individual models for other sites (namely GASCO Asab, GASCO Ruwais and GASCO Buhasa) were developed and tested individually. Once the site individual models were satisfactory, an integrated model for the entire Company was developed. In the current model, energy calculations are simplified yet reflect the overall consumption approximately. This was intentionally designed this way with the design philosophy of starting simple and adding complexity with time. It was more important that all the individual plant models work in sync and make complete technical sense when integrated together to run as one global model. Adding rigorous energy at this stage would have made the model very complex and un-tenable.

Several common scenarios of the integrated model were tested and fine-tuned progressively to match the plant behavior reasonably well. Upon reaching a certain confidence and maturity level, the model was rolled-out for the preparation of the integrated monthly plans.

The team responsible for the monthly planning is designated as the LP Team. The LP team consists of members from the Planning section in Central Headquarters and a couple of

representatives from each plant site. It is purely team work and collaboration among the LP team that determines the success of this optimization planning exercise held on a monthly basis.

The major steps in the monthly production plan process are presented

The process is aligned to the famous Deming's PDCA cycle (Plan-Do-Check-Act) and is self-evolving.

Continuous improvement is an integral part of this process.

The following section gives more details on each step in the process.

## INPUT COLLECTION and VALIDATION

As goes the famous, yet clichéd expression «Garbage in is garbage out», input data is extremely critical to the effectiveness of the planning process. Therefore, the accuracy and thoroughness of this step is a critical success factor in the entire optimization planning process.

### **The following are the main inputs to the model:**

- A. Feed forecasts from up-stream reservoirs
- B. Demand from down-stream plants and customers
- C. Trend of product prices in the previous months
- D. Operational constraints like compression capacities, equipment availabilities
- E. Planned shut-downs or slow-downs anticipated
- F. Recommendations and lessons learned from previous variance reports
- G. Feed compositions expected

Based on the experience over the last one year or so, we observe that the business at GASCO is extremely dynamic and this causes some of the planning assumptions made in the end of the previous month to go invalid due to rapid changes as the current month passes. As stated earlier, this is because GASCO is essentially a mid-stream processing company that is directly impacted by any changes in up-stream as well as down-stream plants. More importantly, GASCO also has little influence to actually control the changes occurring in up-stream as well as down-stream plants.

Due to the above, it becomes necessary to plan for multiple likely scenarios every month. It also becomes necessary to modify issued plans mid-month due to significant new developments especially change in sales gas demand or raw ethane from down-stream or outages of feed gas trunk-lines up-stream.

One known limitation in the inputs is the non-availability of reliable composition analyses and measurements for the feed-streams from up-stream reservoirs. This is one single factor that significantly affects the accuracy of the model predictions.



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## LP MODEL RUNS and OUTPUT ANALYSIS

Once all inputs are collected, reviewed and thoroughly validated by the LP team, the engineers at Central Planning Headquarters input these into the global LP model. They prepare the LP plan for the different planning periods and incorporate planning scenarios. The complexity of the monthly plans depend of the number of scenarios each month and varies from 2 to about 10 for some months. The draft plan thus generated is internally reviewed for any errors and feasibility before issuing to the full LP team for their review comments. In general, the draft plan is issued for review and comments by 20th of each month. The review comments received are incorporated and the final plan issued by 28th of each month.

This is a key step and can be considered as the core of this process. This step really needs extensive collaboration and engineering inputs from site LP focal points.

### The following main activities are performed in this step:

- A. Model predictions and outputs are thoroughly discussed with site focal points.
- B. The practicality of the predictions is validated.
- C. The implementation feasibility is reviewed.
- D. A collective agreement is reached for implementation.
- E. The site focal point reviews the model recommendations with the site technical teams and site operations engineers to get their agreement.
- F. Changes and adjustments are made to ensure a smooth implementation.

*It is important to note that since site focal points are closely involved in the whole exercise, there is very good ownership of the implementation methodology.*

## IMPLEMENT

The agreed plan is communicated by the site focal points with the site Operations for implementation.

Since Operations were always in the loop from the beginning, they are already prepared and ready for implementing the agreed plan. Their feedback was already taken into consideration in previous step 2 by the site LP focal points. Hence, this step becomes automatically easy. Operations engineer keep track of anything that prevents successful implementation and at the end of the month, discuss the same with the site LP focal points and become lessons learned.

## DAILY MONITORING OF PROGRESS

The fundamental idea behind daily monitoring by the LP team is to see how the plan is being implemented by Operations. Instead of waiting till the end of a whole month to analyse if the plan worked, what is being done is to check

and report progress and deviations every single day. This makes it very practical to make corrections in a timely manner.

The monetary impacts and gains reported on a daily basis are preliminary and are more at a high-level and supposed to be as a general guidance rather than for accurate reporting purposes. This helps management to priorities resources and tasks to attend to the top priorities first.

There is a big mind-set that is forced by such daily progress reporting. Firstly, it forces all to think in terms of **money** and not just in terms of routine operations. Secondly, it helps resolve conflicts between different disciplines in favor of the most economical path. Thirdly, it helps foster innovation and out-of-the-box thinking to **minimize losses** and **make profits**.

### Some of the Key Performance Indicators KPIs in terms of lost opportunities that are monitored daily are:-

- A. *Actual recovery versus the proven maximum recovery*
- B. *Number of refrigeration compressors used versus the optimum possible on every given day*
- C. *Economic impact of equipment failures or trips*
- D. *Economic impact of external factors (out of GASCO's scope)*

### Some salient features of this step are summarized below for easy reference:

- A. *Each site focal point is responsible and has the authority to monitor and report the daily variances.*
- B. *Since monitoring is done on a daily basis, it is very easy for operation engineers to correct the course (whenever needed) in a timely manner.*
- C. *At the end of each month, the daily findings and variances are compiled and thoroughly discussed.*

*This is an opportunity for the entire team to reflect on the opportunities and make improvements to the optimization planning process.*

## CONTINUOUS IMPROVEMENT

The idea behind this step is to capture all lessons learned and required updates to the LP model. At the end of each month, the LP team discusses how the plan and actual performance of the plants were. Any areas where the model predictions have to be improved are noted and actions taken to update the model.

If there are new constraints that were not represented correctly in the model, they are done. If the planning assumptions were not adequate, a plan is made to improve the accuracy of the assumptions. Service-level agreements with other OPCOs is one step to improve the accuracy of the inputs to the model.

A quick review of the time-lines for generating the plan are also re-visited to see if any steps can be automated to speed up the process at the same time improving the accuracy. For example, earlier, we noted that the time available for site focal points to review the LP plan with operations was very less and they had to rush up providing feedback on time. As an improvement, the Draft plan is provided a few days earlier for them to have sufficient time to review and advise feasibility.

Similarly, it was noted early on that several scenarios are very similar to each other and they only differed in some parameters. Therefore we developed a several standard templates with the common scenarios that can be fine-tuned quickly for re-use month after month.

Brain-storming several opportunities for further process improvement is carried out among the LP team.

It is an open forum for everyone to present their observations and any concerns that they may have. As a team, these are addressed in a technical and professional manner.

## KEY BENEFITS

*Based on the one year experience of implementation, here is a compilation of benefits already realized or potential benefits we expect:-*

### Close involvement of sites in the corporate-wide planning

*The implementation of the LP model has raised the involvement and close technical and managerial collaboration among sites to a much higher level. This is because of the close collaboration that is involved right from input collection to implementation and benefits realization. The Planning team at Headquarters can visualize the limitations plants may have in achieving the targets. At the same time, the plant operations are continuously aware of the impact of their plant decisions on other units within GASCO and the overall GASCO revenues.*

### Better production management due to timely course-corrections

*The very organization of LP focal points from each plant as one team with the Headquarters planning team has made corrective actions on an agile and timely manner.*

### Optimum monthly production (by recovery maximization and energy optimization)

*Both recovery maximization and energy optimization are in-built in every production plan issued. This is because the global model optimizes every single plan to maximize revenues. So, for a given set of feedstocks from up-stream, the global model runs mathematically to allocate the feeds to the trains with maximum recoveries while maximizing the production and minimizing overall GASCO complex energy consumptions.*

### Better possibility of meeting and exceeding annual production targets

*It is the goal of every planning team to ensure that their annual plan is achieved and if possible exceeded.*

*By employing the LP model for the annual production plan, it is possible to understand the opportunities that can be tapped to meet and exceed the annual targets.*

### Future potential to add further rigor to energy predictions

*Currently, the global model operational at GASCO that has simplified energy calculation. In future, it is possible to conceptually integrate the LP model with rigorous high-fidelity process models that provide predictions on energy factors. In this way, the global GASCO-wide LP model can optimize for energy more rigorously.*

### Sets the stage for real-time optimization across GASCO in future

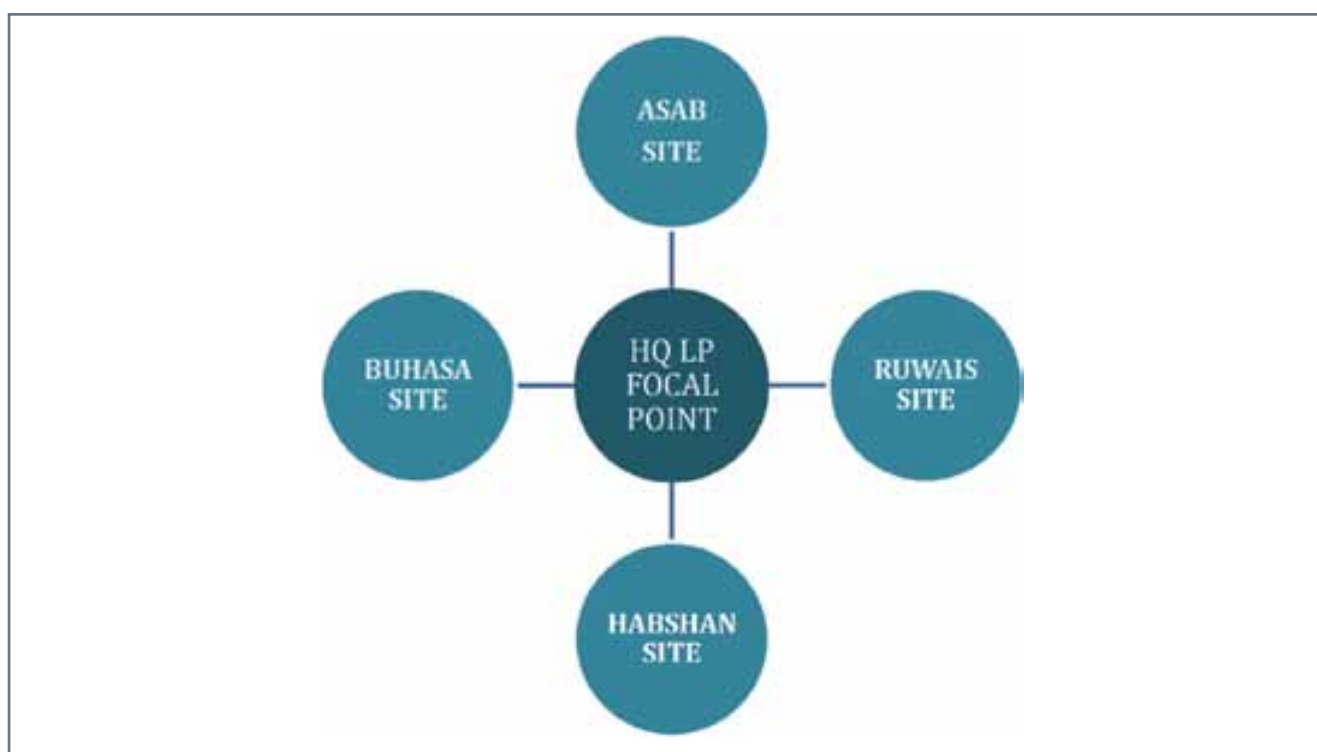
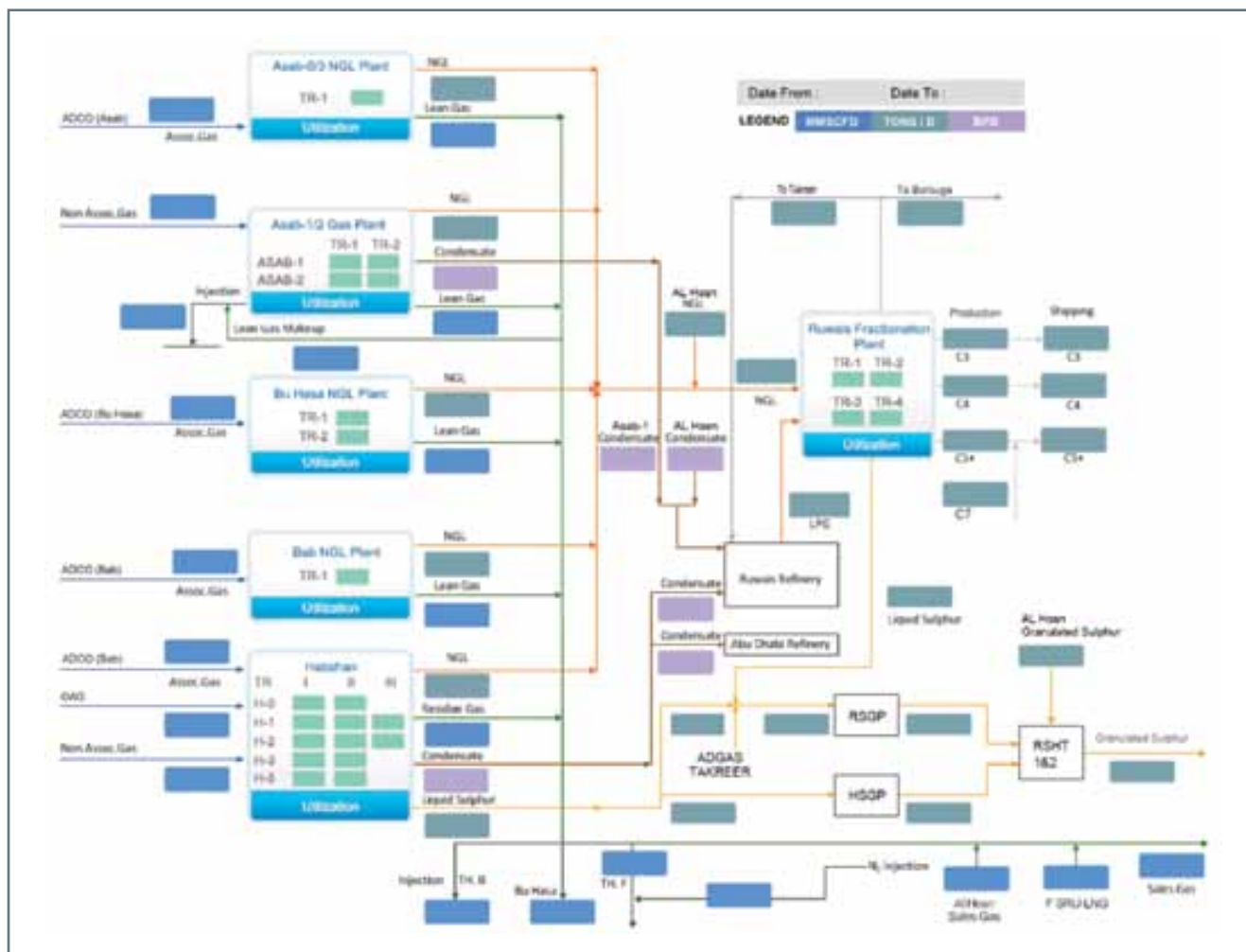
*The current global GASCO-wide LP model is an off-line model. In order for the model outputs to be implemented, some steps need to be manually taken by Operations and Process engineers. Certain APC (Advanced Process Control) set-points need to be updated based on the LP model results. This gives a business case for Real-time optimization for automatic control based on LP model.*

## BEST PRACTICES

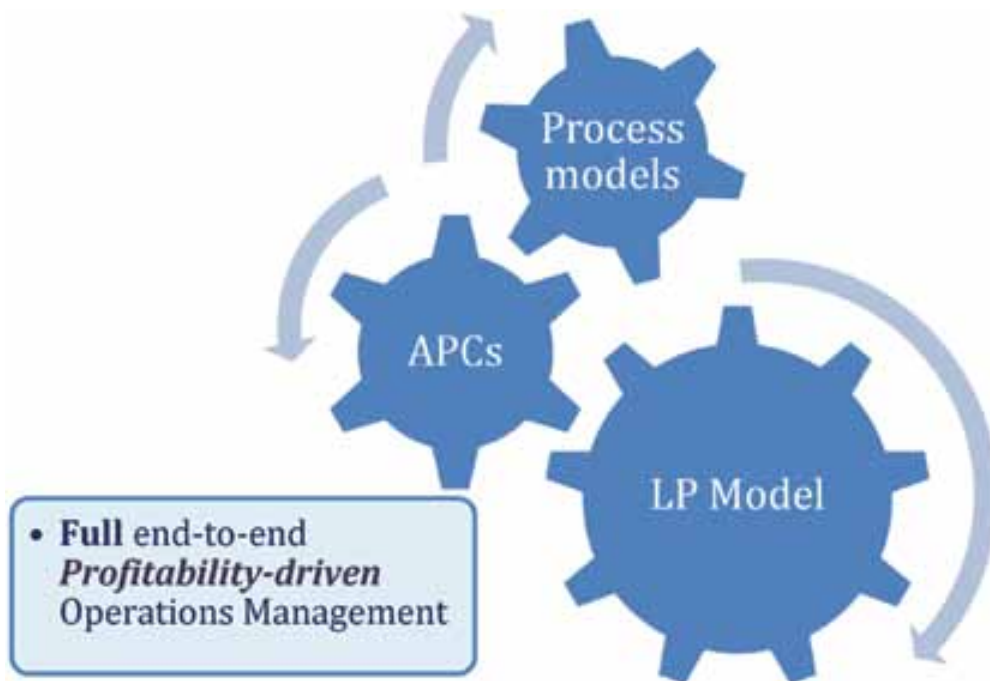
*It is worth to note that linear programming is a well-known mathematical technique, commonly deployed in the petroleum refining sector. However, it is seldom deployed in the oil and gas industry. In this context, this work is very interesting and serves as a useful case-study for reference by process engineers and planning engineers in the oil and gas industry. There are potential benefits that can be derived by a creative application of Linear Programming in the oil and gas industry.*

## NEXT STEPS

*In the next steps, what we visualize is a collaborative environment where GASCO-wide Global LP model gets inputs for yields from rigorous process models. The outputs from the GASCO-wide Global LP model sends set-points to APC controllers that actually drive the plants to achieve the plans. The drawing below shows the general conceptual overview:-*







## Satellite Applications in Oil Industry

By: Dr. Ahmed Nooh  
Egyptian Petroleum Research Institute



### Abstract

Satellite applications in oil industry  
DR. Ahmed Nooh  
Egyptian Petroleum Research Institute

### Introduction

Satellite have widely used in all our life applications as agriculture , land resources, geology and minerals, survey and mapping, ground water as well as in oil industry, among these applications

### Satellite application in oil industry

In oil industry there is three categories: upstream, Midstream and downstream

■ **Upstream** – Exploration and Production, to include site

selection, baseline assessments, environmental planning and assessments, well pad/drill site construction, and petroleum extraction.

■ **Midstream** – Transportation of crude oil/natural gas from the wells to processing facilities, to include pipelines, tankers, rail, barge and truck.

■ **Downstream** – Refining of crude oil and processing/ refining of natural gas to result in products such as gasoline, diesel fuel, kerosene, and lubricants. We'll also include gas and power utilities, which serve end customers through public and private utility companies.

### 1.The position of the drill ship in offshore drilling operations

Drilling ships is controlled by dynamically positioning equipment or subsea beacons which emit a signal which are

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EDUCATION: Associate.Prof at TheAmerican University in cairo PhD. in Petrophysics.Waseda and Menofia University, 2003.

ACADEMIC EXPERIENCE: Faculty of Science and Engineering, The AmericanUniversity in Cairo (1 / 9 / 2010 – Now, full time Ass.Prof of drilling, completion and workover).

-Faculty of Petroleum Engineering, The BritishUniversity in Egypt (21 / 12 / 2008 – 1 / 9/ 2010, full time lecturer and Ass. prof), Undergraduate Level: Oil well drilling, Advanced drilling Engineering, Horizontal drilling, Drilling fluids, Principles of Petroleum Geology, Well logging, core analysis, Development Geology, Completion and workover, Reservoir Rock properties, Reservoir Engineering.

-Petroleum Research Institute, Cairo (Full time Researcher : (1 / 12 / 2005 -21 / 12/ 2008) Faculty of Science, Menofia University, Egypt : (2003 - 2008), Graduate Level:Method of Prospecting. And Well Logging



picked up by sensors on the bottom of the vessel.

These sensors then send signals to the vessels controls to “activate” the thrusters, keeping the ship in position.

Drilling Ship positioning

## 2. Satellite technology can monitor buried pipelines and oil spills in offshore areas

Satellite can detect small leaks long before the naked eye can see them and head off multi-million dollar consequences

One of the techniques put to work by the science and software team at Satelytics is to examine vegetation health. This process, one of many used to detect leaks, can provide great insight as a surrogate for infrastructure conditions below the surface.

The solution to monitoring pipelines buried beneath the earth’s surface can be found in outer space. No oil and gas company wants a pipeline to leak. Aside from the potential effects on the environment, wildlife, and local communities, a contaminant release costs time and money, and can negatively impact a company’s reputation. That’s why companies must invest substantial time and money to constantly monitor pipelines.

While newer pipelines may utilize fiber optics and computational monitoring systems, it’s extremely difficult to retrofit older pipelines with that kind of technology. So, for pipelines that are already buried, companies often use ground patrols, either by ATV or foot, or fly planes over pipeline rights-of-way using pilots trained to visually detect a release. But those processes are labor intensive and incredibly expensive

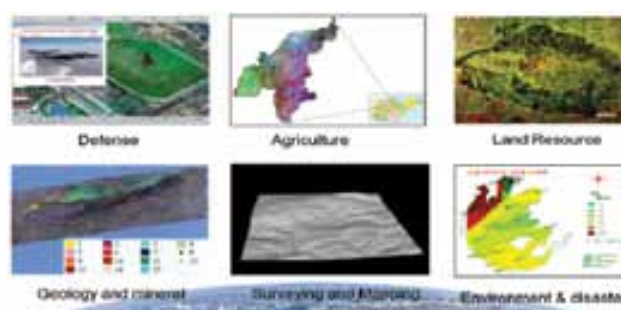
## 3- monitoringthe storage tank and Refinery operations

Oil and gas storage tanks could be detected using infrared and thermal sensors via satellite, Also the refinery system could be monitoring via satellite to follow up the operation and early detection for unscheduled events as fire

## 4.Oil Spells detection by Satellite

Satellite could detecte the oil spills especially in offshore areas to protecte the environment and all the offshore and sea organisms

So Satellite technology could be the solution for most of the oil industry problems and at the long run could facilitate data transfer and data management especially if they combined with Artificial intelligence as anew technology

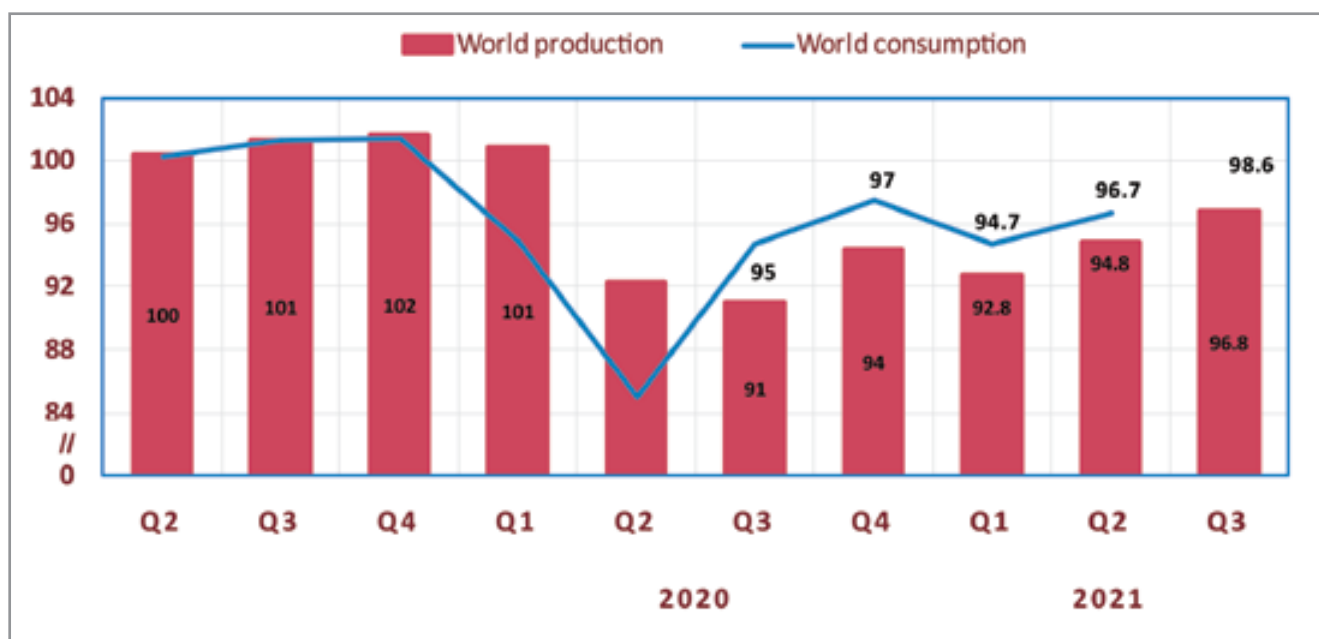




# INDUSTRY AT A GLANCE

by: Ali Ibrahim

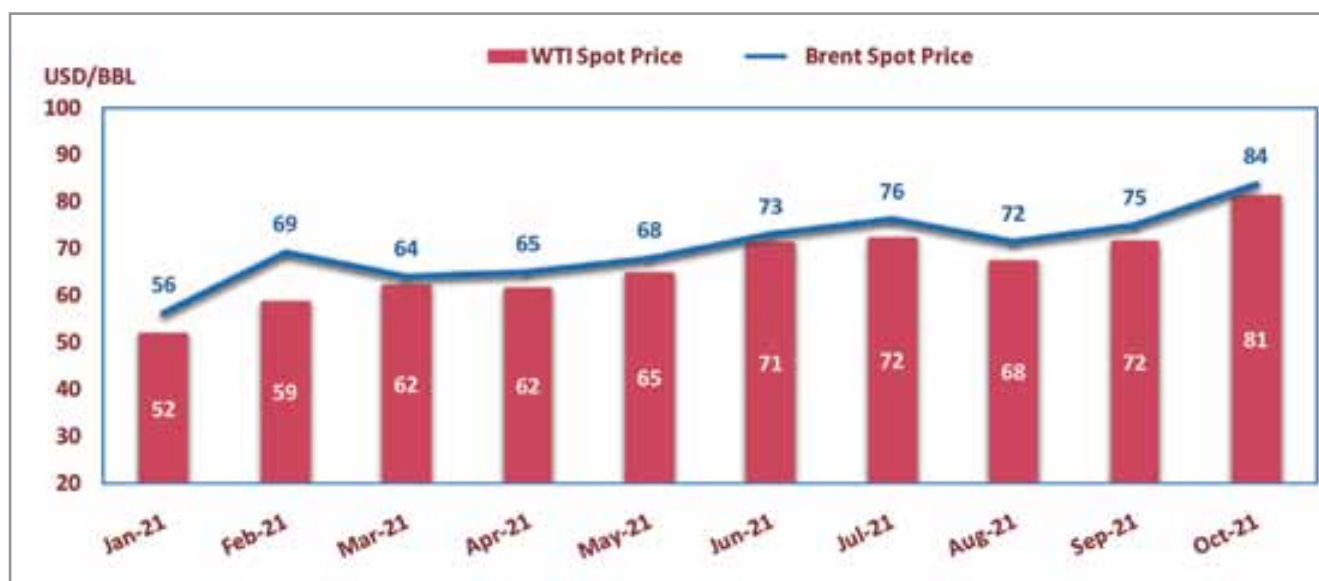
**World liquid fuels production and consumption balance (MMBPD)**  
million barrels per day



## OPEC Crude Oil Production

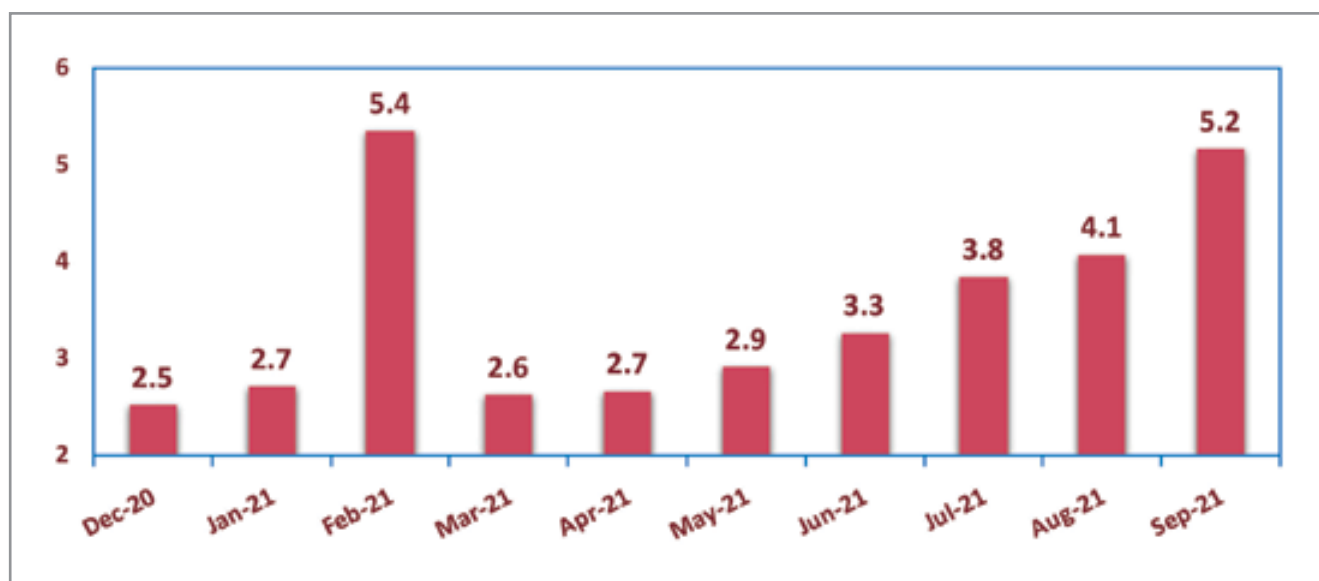


## Crude Oil Prices

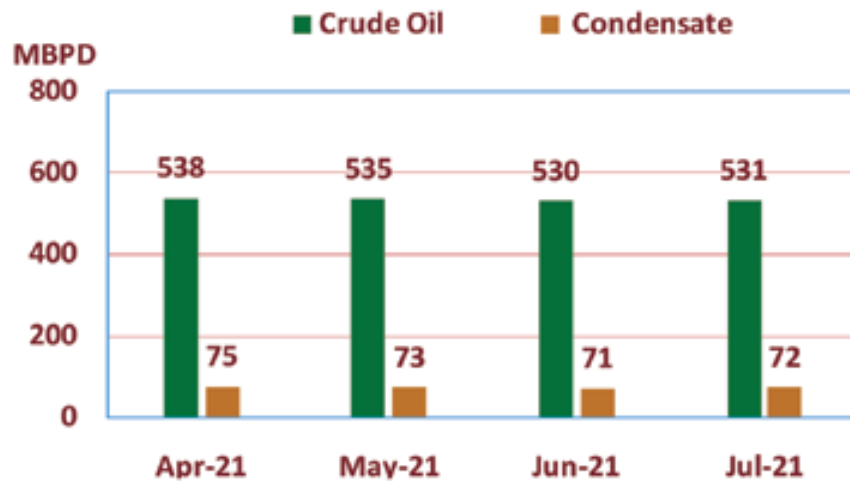


## NYMEX Natural Gas Prices

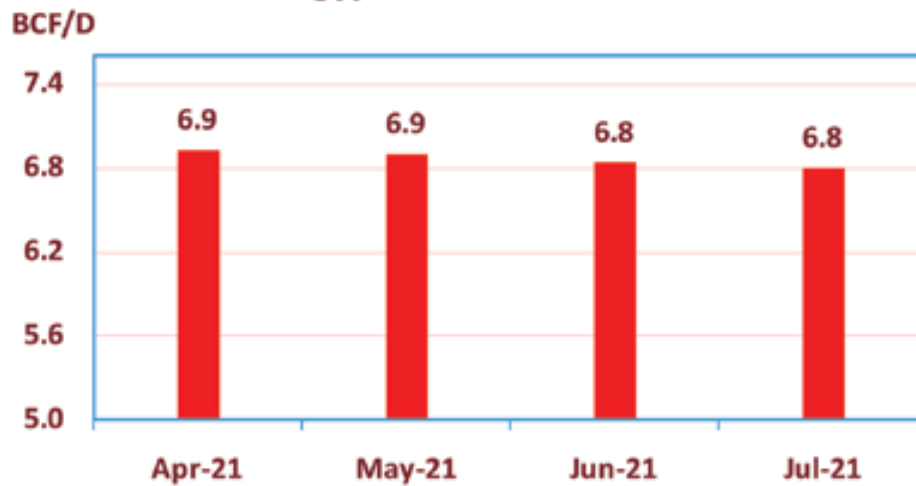
USD/Million BTU



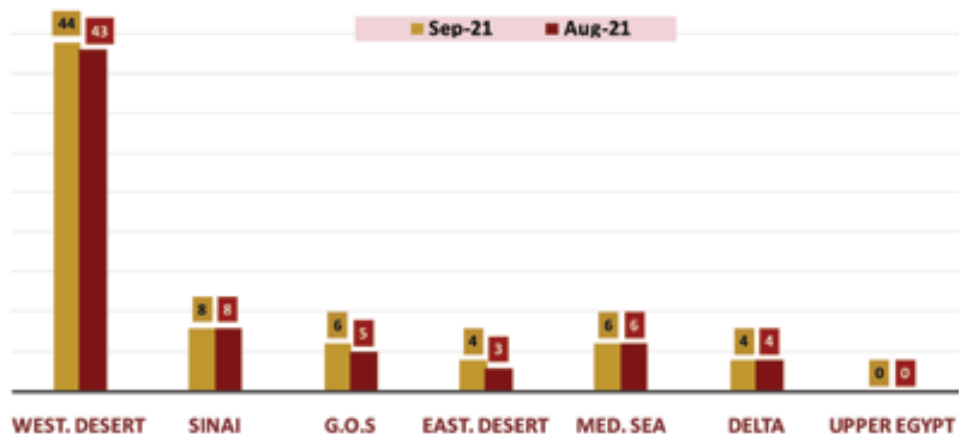
## Egypt's Oil and Condensate Production



## Egypt's Gas Production



## Egypt's Geographical Rig Count





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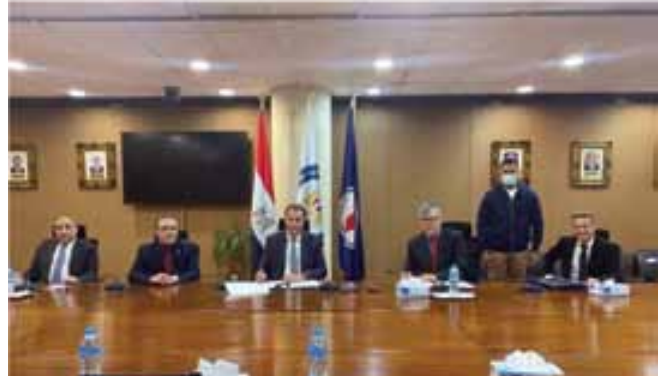
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## انرجين: تعديل اتفاقية شمال ادكو البحريه سيساهم بحوالى 90 مليون قدم مكعب غاز يوميا

ابرمت شركه انرجين ايجيبت ليمتد و الهيئه المصريه العامه للبترول اعتمادا من معالى وزير البترول و الثروه المعدنيه المهندس طارق الملا التعديل الثانى لاتفاقية التزام شمال ادكو البحريه بدلتا النيل الصادره بالقانون رقم ١٤٢ لسنة ٢٠٢١ للبحث عن البترول و استغلاله. و الجدير بالذكر ان هذه الاتفاقية المعدله مع اتفاقه امتياز شمال العامريه البحريه سوف تساهم فى تنمية عدد من الاكتشافات من خلال مشروع تكاملى يشمل حفر عدد ٤ ابار و ربطها على تسهيلات شركه ابوقير مما يساهم بمعدلات انتاج حوالى ٩٠ مليون قدم مكعب من الغاز فى اليوم بالإضافة إلى ١٠٠٠ برميل متكثفات فى اليوم و ذلك بتكلفه بتكلفة استثمارية لهذا المشروع قدرها ٢٣٦ مليون دولارمما يؤكد اهتمام شركه انرجين للعمل فى مناطق الالتزام المصريه.



قال المهندس نبيل عبد الصادق رئيس مجلس إدارة الشركة العامة للبترول أن إستثمارات الشركة خلال الربع الاول من العام المالى الحالى سجلت ٦٦٥ مليون جنيه، بنسبة تنفيذ ٩٦٪ من الخطة المقررة لتلك الفترة. ولفت الى أن الشركة إنتهت من حفر ١٢ بئرا بتروليا على مدار الربع الاول من العام المالى الجارى ٢٠٢٢/٢٠٢١. وتضمنت قائمة الآبار البترولية التى تم الإنتهاء من حفرها (٤) آبار تنموية فى منطقة حقول الصحراء الشرقية، و (٨) آبار تنموية فى منطقة حقول الصحراء الغربية.

وأكد رئيس الشركة العامة للبترول انه جارى حاليا إستكمال خطة حفر الآبار المقررة للعام المالى الجارى بهدف تعويض التناقص الطبيعى فى إنتاجية الحقول، والحفاظ على معدلات إنتاج مرتفعة خلال الفترة المقبلة. وتقوم الشركة العامة حاليا بحفر ٥ آبار إستكشافية وتنموية متضمنة بئر استكشافى بحرى، فضلا عن ٤ آبار تنموية برية. جدير بالذكر ان معدلات انتاج الشركة العامة للبترول وصل إلى ٧٤ ألف برميل مكافئ يوميا خلال سبتمبر الماضى، وهو يعد رقما قياسيا جديدا لإنتاج الشركة منذ تاريخ إنشائها فى عام ١٩٥٧، بحسب بيان صادر من وزارة البترول حينها. وقال عبد الصادق أن الشركة تنفذ حاليا حزمة من المشروعات، لدعم عملياتها بمواقع الإنتاج وتحقيق مستهدفاتها.

**٣ مليارات جنيه مشروعات تحت التنفيذ لـ «العامة للبترول»**

## "أموك" تتحول للربحية في الربع الأول بدعم 3 عوامل

كشفت القوائم المالية المجمعة لشركة الإسكندرية للزيوت المعدنية - أموك، خلال الربع الأول من العام المالى ٢٠١٩-٢٠٢٠، تحول الشركة من الخسائر إلى الربحية، على أساس سنوي. وأوضحت الشركة في بيان لبورصة مصر أنها حققت أرباحاً بلغت ٥٤,٢٩٩ مليون جنيه خلال الفترة من يوليو حتى سبتمبر الماضى، مقابل خسائر بلغت ٣٧,٢٨ مليون جنيه بالفترة المقارنة من العام المالى الماضى. وارتفعت مبيعات الشركة خلال الربع الأول من العام المالى الجارى لتسجل



٣,٧٢ مليار جنيه بنهاية سبتمبر، مقابل ٢ مليار جنيه خلال نفس الفترة من العام المالى الماضى.



## البترول تمد شبكات الغاز الطبيعي بأحياء العاصمة الإدارية والعلمين الجديدة

ذكرت وزارة البترول والثروة المعدنية المصرية، أن شركة "مودرن جاس" نفذت أعمال شبكات توصيل الغاز الطبيعي بالعاصمة الإدارية في كل من حي الوزارات وساحة الشعب وحي المال والأعمال ومنطقة ٥٥٠ فدانا بإجمالي أطوال حوالى ٥٠ كم. وأشارت وزارة البترول، إلى أنه تم الانتهاء من أعمال التركيبات بعدد من المنشآت والمواقع، ونفذت شبكات الغاز بإجمالي أطوال نحو ١١٠ كم في العلمين الجديدة والتي تخدم المنشآت الواقعة بالمنطقة الشاطئية والمنطقة الجنوبية بالمدينة، وفقا لوكالة أنباء الشرق الأوسط.

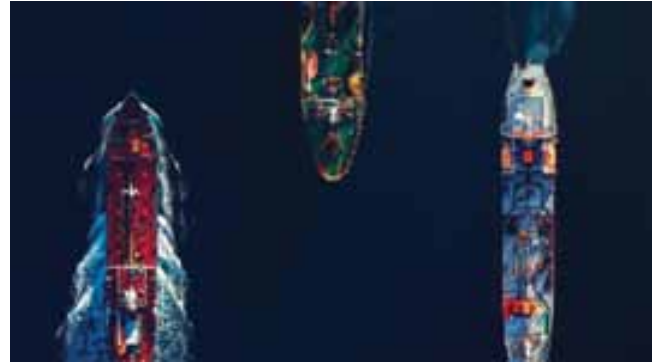
## وزير البترول يلتقي رئيسة «وينترشال ديا» الألمانية للعمليات ويبحث أنشطة الشركة في مصر



التقت السيدة دون سامرز الرئيس التنفيذي للعمليات بشركة وينترشال ديا الألمانية مع المهندس طارق الملا وزير البترول والثروة المعدنية بحضور المهندس سامح صبري الرئيس التنفيذي للشركة في مصر، خلال فعاليات معرض ومؤتمر أبوظبي الدولي للبترول أديبك ٢٠٢١. وناقشوا التزام شركة وينترشال ديا طويل الأمد كشريك ومستثمر موثوق به في مصر، فضلاً عن التوقعات المشرقة لمصر كمركز إقليمي للغاز. بالإضافة إلى ذلك، ناقشت دون سامرز ووزير البترول المهندس طارق الملا مسار انتقال الطاقة في وينترشال ديا في سياق مؤتمر الأمم المتحدة بشأن تغير المناخ COP26 و COP27 الأخير الذي سيعقد في القاهرة. إن شركة وينترشال ديا، شركة الغاز والنفط المستقلة الرائدة في أوروبا، لديها عدة أنشطة في مصر، حيث تنتج النفط في خليج السويس والغاز في دلتا النيل في دسوق، بالإضافة إلى كونها شريك لشركة بريتيش بتروليوم في مشروع الغاز البحري غرب دلتا النيل. وعلاوة على ذلك، فإن وينترشال ديا متحمسة للاستكشاف مرة أخرى في مصر في شرق دمنهور بالقرب من دسوق.

## أوابك: مصر تحقق نمواً 900% بصادرات الغاز الطبيعي خلال 2021

كشف تقرير تطورات الغاز الطبيعي المسال والهيدروجين للربع الثالث ٢٠٢١، أن النمو الأكبر في حجم صادرات الدول العربية خلال الربع الثالث من عام ٢٠٢١ جاء من جمهورية مصر العربية التي قامت بتصدير نحو ١ مليون طن، علماً بأنه خلال نفس الفترة من العام السابق ٢٠٢٠ بلغت الصادرات نحو ١٠٠ مليون طن فقط بسبب تهاوي الأسعار الفورية في الأسواق العالمية التي لم تحقق الجدوى الاقتصادية للتصدير، لتحقيق بذلك نمواً على أساس سنوي ٩٠٠٪، وهو معدل النمو الأعلى عالمياً خلال الربع الثالث من عام ٢٠٢١.



## 830 مليون جنيه إجمالي تكلفة وحدة الأسفلت بشركة السويس للبترول

قاربت شركة السويس لتصنيع البترول على الانتهاء من تنفيذ مشروع وحدة إنتاج الأسفلت، ليتم افتتاحه خلال أيام. بلغت إجمالي الاستثمارات التي أنفقت على تنفيذ المشروع حتى الآن ٨٣٠ مليون جنيه، ويستهدف إنتاج الأسفلت بطاقة ١٢٠٠ طن يومياً. ويقدر معدل العائد الداخلي على الاستثمار بالمشروع الجديد بنحو ٢٥٪ بينما تبلغ فترة استرداد رأس المال حوالي ٣،٩ سنة.





## تنفيذ خط غاز «العامرية - العلمين» لخدمة الساحل الشمالى

عقد المهندس طارق الملا، وزير البترول والثروة المعدنية، اجتماعاً للوقوف على تقدم عدد من أهم المشروعات الجارية تنفيذها للتوسع فى نقل وإمداد الغاز الطبيعى للمدن عبر خطوط الانابيب ومشروعات دعم البنية الأساسية للشبكة، حيث استمع لشرح من المهندس ياسر صلاح، رئيس شركة جاسكو المشغلة للشبكة، والذى أوضح أنه يجرى حالياً تنفيذ مشروع خط غاز العامرية - العلمين بطول ١٢٠ كم لبدء توصيل الغاز لمناطق الساحل الشمالى حتى مدينة العلمين الجديدة، إلى جانب مشروع خط التينة غرب «ميت نما» بطول ١٧٠ كم للحفاظ على إمدادات الغاز بالمعدلات المطلوبة، ومشروع توسعات محطة ضواغط دهشور فى إطار زيادة كميات الغاز المدفوعة إلى مناطق الصعيد.. كما تم استعراض مشروع توسعات مجمع غازات الصحراء الغربية.

## الكهرباء تتوصل لاتفاق مع البترول لتثبيت أسعار الغاز لاعمالها

قال محمد شاكر وزير الكهرباء والطاقة المتجددة، إن وزارته اتفقت مع وزارة البترول على تثبيت أسعار الغاز لقطاع الكهرباء المصري. وأضاف شاكر، في تصريح لقناة "العربية"، أنه بالتالى لن يتم زيادة أسعار الكهرباء على المستهلكين مع ارتفاع الأسعار الحالية للغاز. وأوضح شاكر أن خطة إعادة هيكلة دعم الكهرباء في بلاده ستبقى دون تغيير، على أن تنتهي في ٢٠٢٥. وقال إن صادرات الكهرباء إلى الأردن تبلغ ٢٥٠ ميجاوات يوميا، فيما يصل حجم التصدير إلى ليبيا نحو ١٥٠ ميجاوات. وأضاف أن مصر تصدر إلى السودان نحو ٨٠ ميجاوات وسيتم زيادتها قريبا إلى ٣٠٠ ميجاوات بعد إضافة السودان لعدد من المعدات، التي تم التعاقد عليها بالفعل، على خط ربط الكهرباء مع مصر. وذكر أن هناك اهتماما من مؤسسات محلية وأوروبية للمساهمة في خط الربط الكهربائي مع قبرص واليونان، بطاقة



## ارتفاع إنتاج الغاز الطبيعى فى أغسطس الماضى إلى 4584 ألف طن



ارتفع إنتاج مصر من الغاز الطبيعى في الفترة الأخيرة، وفقا لبيانات حكومية، حيث بلغ حجم إنتاج الغاز الطبيعى نحو ٤٥٨٤ ألف طن في شهر أغسطس الماضى "بيان مبدئى"، بينما كانت ٣٩٣١ ألف طن في شهر أغسطس عام ٢٠٢٠، بزيادة بلغت نحو ٦٥٣ ألف طن. وقالت البيانات الصادرة عن الجهاز المركزى للتعبئة العامة والإحصاء، إن إنتاج مصر من الزيت الخام والمكثفات نحو ٢٤٤٠ ألف طن في شهر أغسطس الماضى، مقابل ٢٥٩٨ ألف طن في نفس الشهر عام ٢٠٢٠. وكان الإنتاج المحلي من الغاز الطبيعى قد شهد ارتفاعا ملحوظا في شهر يونيو الماضى، حيث بلغت قيمة الإنتاج المحلي من الغاز نحو ٤ ملايين ٣١١ ألف طن، بينما كانت ٣ ملايين ٧٠١ ألف طن في شهر يونيو عام ٢٠٢٠، بزيادة بلغت نحو ٦١٠ ألف طن، كما أن الاستهلاك المحلي من الغاز الطبيعى شهد ارتفاعا مماثلا، حيث بلغت قيمة الاستهلاك المحلي نحو ٤ ملايين ٤٧ ألف طن في شهر يونيو الماضى، مقابل ٣ ملايين ٧٩٩ ألف طن في نفس الشهر عام ٢٠٢٠، بزيادة بلغت نحو ٤٩٩ ألف طن.

## البترول: ندرس ربط حقل إفروديت القبرصى مع مصر بالتعاون مع إينى



أكد المهندس طارق الملا وزير البترول والثروة المعدنية تقديم كامل الدعم لقبرص فى رئاستها لمنتدى غاز شرق المتوسط خلال العام المقبل اعتباراً من يناير ٢٠٢٢ موضحاً أن هذا الدعم يمتد إلى جهود تطوير حقل إفروديت القبرصى والتعاون فى ذلك بين شركتى إيجاس وإينى ودراسة كافة المقترحات لربطه بمصر.

جاء ذلك خلال المباحثات الثنائية التى عقدها الملا مع ناتاشا بيليديس وزيرة الطاقة والتجارة والصناعة القبرصية والتى تناول الوزيران خلالها عدداً من موضوعات التعاون المشترك فى إطار منتدى غاز شرق المتوسط الذى حقق بتكامل الجانبين مع الدول الأعضاء نتائج متميزة ، عزم الوزيران على زيادتها خلال الفترة المقبلة.

## 26 مليون دولار تكلفة مشروع اكتشاف «الحمد» بامتياز «العامة للبترول»

قُدرت التكلفة الاستثمارية التى أنفقتها الشركة العامة للبترول لتنفيذ مشروع اكتشاف «ساوث إيست الحمد البحرى» الواقع بامتيازها بمنطقة خليج السويس بـ ٢٦ مليون دولار.

وقد تضمن المشروع ربط كامل آبار الإكتشاف البالغ عددها ٤ آبار على خريطة الإنتاج، كما تم إنشاء خطين للإنتاج بطول ٤ كم. وبلغ مجموع إستثمارات إكتشاف «الحمد» بدون تكلفة حفر الآبار سجل ٦, ٢١ مليون دولار، وبإضافة تكلفة الحفر تكون جملة إستثمارات المشروع المنفقة قرابة ٢٦ مليون دولار.

وتتراوح إنتاجية حقل الحمد المخططة من الآبار الأربع بين ٣ إلى ٤ آلاف برميل بترول يوميا.



## «هواوي تكنولوجيا» توقع مذكرة تفاهم مع «بتروجت» للتعاون في حلول التكنولوجيا

وقعت شركة هواوي تكنولوجيا، العاملة في مجال توفير حلول تكنولوجيا المعلومات والاتصالات، مؤخراً اتفاقية تعاون مع شركة «بتروجت» للمشروعات البترولية والاستشارات الفنية، وذلك على هامش المشاركة في فعاليات معرض ومؤتمر أبوظبي الدولي للبترول «أديبك ٢٠٢١»، لتحقيق التحول الرقمي، تماشياً مع الرؤية الاستراتيجية للقطاع البترول.

وتهدف الاتفاقية إلى العمل جنباً إلى جنب، لتعزيز القيمة الصناعية للمشروعات التي تقوم بها بتروجت، بوصفها إحدى شركات قطاع البترول المصري، عبر استخدام حلول تكنولوجيا المعلومات والاتصالات التي توفرها هواوي في كل مراحل المشروعات البترولية.





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