EGYPT
OIL&GAS
NEWSPAPER

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EGYPS
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CHEIRON

CHEIRON'S NEW ACQUISITION:

A TROVE OF EXCITING OPPORTUNITIES

AN INTERVIEW WITH
DAVE THOMAS
CHEIRON'S CEO

SCAN TO DOWNLOAD EOG MOBILE APP

EDITOR'S LETTER

EGYPT OIL&GAS NEWSPAPER
EGYPT'S LEADING OIL & GAS MONTHLY PUBLICATION

Towards a Greener Future

The United Nations Climate Change Conference (COP26) took place in Glasgow recently. World leaders discussed how to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. Energy related topics, were on the top of the conference's agenda.

Thus, EOG's November issue is dedicated to discuss the changes happening in the oil and gas sector amid energy tarnation. In our industry insights section, we highlighted the carbon capture potential in Egypt. Our Research and Analysis team prepared a full report analyzing Egypt's renewable energy sector. Moreover, we collected all the recent updates of development plans and emissions reduction efforts in our overview section.

We had a great chance to interview Dave Thomas, Cheiron, CEO. He shared with us the details of the company's acquisition of the Western Desert assets from Shell. He also highlighted the company's future plans in the Egyptian oil and gas market. In addition, our energy economics section discussed the price tag for a carbon neutral future. The legal section covered the future of oil and gas environmental regulations.

Wishing you an informative read!

MAHINAZ EL BAZ
Acting Editor-In-Chief
Research & Analysis Manager

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TOP 5

GPC PRODUCTION HITS NEW RECORD OF 74,000 BOE/D

General Petroleum Company's (GPC) production rate jumped to 74,000 barrels of oil equivalent per day (boe/d), setting a new record for the company since its establishment in 1957.

GPC's Chairman Nabil Abdelsadek reviewed some of the company's most important accomplishments, referring to the new 7 oil discoveries in concession areas and the digging of 78 new oil wells.

As for the new projects, Abdelsadek explained that Early Production Facilities (EPFs) will enable them to put South-East Hamad and HH-33/2 fields into production at an initial rate of approximately 4,700 barrels per day. He added that the construction of the oil shipping line from Sinan gathering station to El Hamra port is underway. Also, the electric supply system of the berths in Amer Fields 4 and 6 is under construction.

GANOPE ACHIEVES HIGH PRODUCTION RATE IN 2020/21

Ganounb El Wadi Petroleum Holding Company (Ganope)'s Chairman Alaa El Batal announced the company's success in achieving a daily average rate of 21,500 barrels per day (bbl/d) of crude oil, 6000 tons of butane, and 3.6 billion cubic feet per day (bcf/d) of natural gas during fiscal year (FY) 2020/21.

Ganope successfully faced a natural decline in wells, but maintained production rates through drilling a number of development wells, boosting the remaining reserves to around 134 million barrels of crude, El Batal noted.

This came as the company developed wells' performance and increased recovery factors through the work of reservoir revaluation studies.

EGYPT TO FINALIZE PROCEDURES OF GAS DELIVERY TO LEBANON WITHIN WEEKS

The required procedures to deliver Egyptian natural gas to Lebanon is set to be complete in the next few weeks, Egyptian Minister of Petroleum Tarek El Molla declared.

This comes in light of what was agreed upon during talks that were held in Cairo over two days with the Lebanese Minister of Energy and Water Walid Fayad and the officials from both sides.

Supplying Lebanon with its needs of Egyptian gas comes under mandates from President Abdel-Fattah El-Sisi to help Lebanon overcome its energy crisis, El Molla noted.

He pointed out that the discussions with his Lebanese counterpart were successful and fruitful in laying down a roadmap for supplying Lebanon with Egyptian gas, including all technical, commercial, contractual aspects, and the supply mechanism. They also agreed on a timetable to complete the procedures. The process will also be coordinated with Jordan and Syria, as Egyptian gas will pass through their territories.

EL MOLLA DISCUSSES CSR STRATEGY IMPLEMENTATION IN OIL, GAS SECTOR

Minister of Petroleum and Mineral Resources Tarek El Molla chaired the first meeting of the Supreme Committee for the Implementation of the Corporate Social Responsibility (CSR) Strategy in the oil and gas sector.

During the meeting, El Molla discussed the action plan of the committee responsible for preparing a comprehensive strategy with annual executive plans for petroleum companies as well as following up on its implementation. Under the leadership of the Minister, the committee aspires to achieve sustainable development goals (SDGs), seeking to boost economic, social, and environmental performance. This can be attained through the contribution of the state-owned and international companies in the implementation of projects and community initiatives.

Strategies and action plans for different projects were also discussed during the meeting. This includes initiatives to help with women's empowerment, Egyptian youth (particularly with special needs), environmental protection, and the "Haya Karima" projects.

EGYPT INCREASES FUEL PRICES BY EGP 0.25 IN Q4 2021

Egypt's Fuel Automatic Pricing Committee has adjusted the fuel prices and increased them by EGP 0.25 per liter for Q4 202.

As of October 8, the prices per liter are as follows: octane 80 at EGP 7; octane 92 at EGP 8.25; and octane 95 at EGP 9.25. As for diesel fuel, its price remained at EGP 6.75 per liter.

This decision was driven by the average prices of Brent crude in the global energy market and the value of the Egyptian pound against the US dollar.

A BLAST FROM THE PAST

On November 17th, the Ministry of Petroleum and Mineral Resources celebrates Petroleum Day in which Egypt restored all Sinai oil fields that were occupied by the Israeli Army. This came after the signing of the second disengagement agreement between Egypt and Israel in September 1975 that led to a partial withdrawal of Israeli troops from Sinai. However, Egypt regained the last seized field, El Morgan, in 1979.

The occupied oilfields in western Sinai included Abu-Rudis, offshore and onshore Balaiem, Sidra, Matarma, Sudr, and Asl and the major oilfields Abu Rudeis and Belayim. The total production of these fields reached 871.56 barrels per day (b/d) before the Israeli occupation.

Abu Rudeis field was one of the oldest oil fields and produced an average of 2700 b/d at the time.

Moving forward, Belayuim land field, together with Belayium Marine, were among the key oil fields in the Gulf of Suez that had underpinned Egyptian oil production. Their Production reached a peak of 235,000 b/d in 1993.

While Sudr, Matarma and Asl fields are affiliated to General Petroleum Company (GPC) and started production in 1946. They were offered in a bid round in 2015 for exploration and production. In 2017, the Minister of Petroleum and Mineral Resources, Tarek El Molla, announced that their production increased to a total of 1400 b/d instead of 1200 b/d.

NUMBER OF THE MONTH

8

Natural Gas Discoveries in FY **2020/21**

The Egyptian Natural Gas Holding Company (EGAS) announced the achievement of six natural gas discoveries in the Western Desert and two discoveries in the Mediterranean Sea in fiscal year (FY) **2020/21**.

The discoveries added reserves of **600** billion cubic feet (bcf) of natural gas. Furthermore, four natural gas development and production projects were implemented with investments of more than $**4** billion. In addition, new **15** wells were brought online with an average daily production rate of **1.4** bcf. This led the average production level to reach more than **6.8** billion cubic feet per day (bcf/d).

ACHIEVEMENTS

PETROBEL INAUGURATES FIRST EMERGENCY ROOM CONNECTED TO UNIFIED NATIONAL EMERGENCY NETWORK

The Egyptian Ministry of Petroleum and Mineral Resources announced the inauguration of the first major emergency room for the oil and gas sector linked to the unified national emergency network in the presence of top leaders from the Egyptian Armed Forces and other senior officials from the oil and gas sector.

Located at the Northern Geographical Committee in Port Said Governorate, the Belayim Petroleum Company (Petrobel) emergency room's digital connection to the national emergency network and public safety is significant because of its important role in maintaining the safety of individuals, facilities and the environment.

EL MOLLA LAYS FOUNDATION STONE FOR GPC'S INTEGRATED PLANT

Minister of Petroleum and Mineral Resources Tarek El Molla laid the foundations for the General Petroleum Company (GPC)'s project to convert the Hamad onshore station into an integrated treatment plant at an investment cost of about EGP 1 billion.

The plant aims to improve processing operations, increase operational capacity, treat oils, and optimize production of GPC and other companies operating in the Ras Ghareb and Shukair regions in the Gulf of Suez.

This came during El Molla's visit to follow up on projects in the Ras Ghareb and Shukair regions in the Gulf of Suez.

During the tour, Gulf of Suez Petroleum Company (GUPCO) reviewed the preliminary results of the $49 million new seismic survey project in the central Gulf of Suez using the latest technologies in the field of seismic surveying.

DOWNSTREAM

EGAS CONNECTS OVER 1.2 M HOUSEHOLDS TO NATURAL GAS IN 2020/21

As part of a national strategy to promote the use of natural gas, Egyptian Natural Gas Holding Company (EGAS) connected more than 1.2 million households with the natural gas grid in 2020/21, recording the highest rate since the beginning of Household Natural Gas Connection Project, the Chairman of EGAS Magdy Galal said.

In addition, natural gas has been supplied to 61 industrial facilities as well as 1666 commercial facilities.

With respect to the expanding use of natural gas as an alternative to gasoline, more than 51,000 cars were converted during the year, bringing the total to 370,000 gas-powered cars. 163 compressed natural gas stations and 27 conversion centers were also established, with the total rising to 369 and 105 respectively.

Most importantly, Galal announced that 9 offshore areas for oil and gas exploration were released in the global bid that was announced last March. He added that 9 new agreements were signed with international companies for natural gas exploration activities, with a total investment of nearly one billion dollars, and a signature bonus amounting to 24 million dollars.

EL MOLLA: NATURAL GAS STATIONS EXPANSION PROGRAM GOING AS PLANNED

During a regular meeting to follow up on the natural gas station expansion program, Minister of Petroleum and Mineral Resources Tarek El Molla stated that the efforts involved in increasing the number of fueling stations across the country are going according to plan.

This initiative is aligned with a presidential directive to expand and promote usage of natural gas as car fuel, since it is less costly and more environmentally responsible. It was also noted during the meeting that the use of natural gas had already witnessed a recent increase.

El Molla urged continuous coordination with the concerned authorities to complete work on the fueling stations. He also encouraged them to be attentive in updating the ministry's smartphone app "Mop Stations". This app is an essential tool to keep Egyptian motorists updated on where the nearest fueling station of any type is located.

In the meeting, there were also discussions about the progress of building the stations and what was required for them to become fully operational. The volume of works that are being done in terms of construction, electromechanical installations, and required equipment were also addressed.

FOLLOW-UPS

EL MOLLA FOLLOWS UP ON OIL, GAS PROJECTS IN GULF OF SUEZ, RAS GHAREB

Minister of Petroleum and Mineral Resources Tarek El Molla toured a number of petroleum projects in the Gulf of Suez and Ras Ghareb regions in the Red Sea.

The projects visited by El Molla included new production facilities for the Gulf of Suez Petroleum Company (GUPCO) and the General Petroleum Company (GPC) to follow up work programs and development plans to increase production rates and support the volume of oil and gas reserves.

During the visit, El Molla stressed the importance of continuing to support the oil and gas sector's production companies in order to drive production from existing fields. He also highlighted the importance of making new discoveries, working to reduce production costs, and expanding the use of modern technologies to improve the efficiency of the production process.

He further highlighted the significance of optimizing the available production facilities and working on developing infrastructure, including pipelines and storage warehouses. He added that this should be done in full cooperation with other companies in the area.

GPC's Chairman, Nabil Abdel Sadek said that its production reached around 74,000 barrels of oil equivalent per day (boe/d), due to increased E&P activities in production and exploration as well as notable achievements in the fields of development and investments.

Moreover, the Northwest Seas gas field has been put on production at an initial rate of 15 million cubic feet of gas per day, Abdel Sadek added.

EL MOLLA INSPECTS REFINERY PROJECTS IN ALEXANDRIA

The Minister of Petroleum and Mineral Resources Tarek El Molla has inspected a number of refinery projects in Alexandria.

During his visit, El Molla emphasized on the importance of boosting the expertise of refinery companies in order to increase their revenues and enhance the national economy.

For his part, Al Amreya Petroleum Refining Company (APRC) Chairman Mabrouk Abd Allah highlighted several projects that his company is working on within the current and next fiscal years (FY). This includes but is not limited to the replacement and upgrading of aromatics facilities, renewing petroleum products tanks, as well as health, safety, and environment projects.

Additionally, Alexandria National Refining and Petrochemical Company (ANRPC) Chairman Salah Gaber showcased the future projects of the company, including the project of increasing high-octane production with costs of $12 million to boost the company's production to 2 million tons per year; in addition to an initiative to exploit hydrogen gases to maximize butane production to 21,000 tons with investments of EGP 136 million.

AGREEMENTS

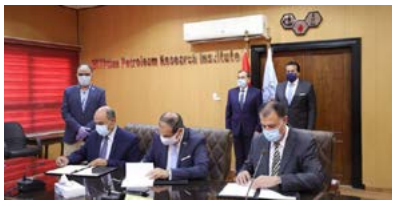
ENPPI, TECHNIP ITALY SIGN MOU ON ENERGY TRANSITION

A memorandum of understanding (MoU) was signed between Egyptian company Engineering for Petroleum and Process Industries (Enppi) and Italian firm Technip to cooperate in the field of energy transition.

Witnessed by Minister of Petroleum Tarek El Molla, the MoU was signed by Enppi's Chairman & CEO Ashraf Bahaa and Technip's CEO Marco Villa.

On this occasion, Bahaa said that this MoU is seen as a further tangible step towards cooperation between the two sides in the field of the energy transition as well as extending their existing cooperation through opening new areas for joint work.

NCTU, EPRI, EGPC SIGN COOPERATION PROTOCOL



New Cairo Technological University (NCTU) signed a cooperation protocol with the Egyptian Petroleum Research Institute (EPRI) and the Egyptian General Petroleum Corporation (EGPC).

This cooperation protocol aligns with Egypt's efforts to improve the educational system. It also follows presidential directives for all Egyptian institutions to work together and cooperate as partners in development, especially between organizations of production and scientific research. Furthermore, it was emphasized that all institutions should develop programs of higher education that are in line with the skills and job demands of the future.

The scope of this cooperation will include organizing training courses for the students in the field of petroleum technology. Future students will be provided with the knowledge and experience necessary to operate production sites, process and transport crude oil and natural gas in accordance with international standards. In addition, the initiative also seeks to assist the students in pursuing opportunities in the domestic and global labor markets.

PETROCHEMICALS

ASSIUT OIL REFINERY PRODUCES $945 MILLION WORTH OF PETROLEUM PRODUCTS

Assiut Oil Refinery secured around 65% of the petroleum products needs in Upper Egypt as it refined 2.6 million tons of crude oil in fiscal year (FY) 2020/21, producing worth $945 million of petroleum products, Assiut Oil Refining Company (ASORC)'s Chairman Maged El Kordy stated.

The petroleum products included high-octane benzene, naphtha, diesel, butane, and jet fuel, which witnessed an increase in the quantities produced from these high-value products to meet the local consumption.

The hydrogen produced from the new project was also used as fuel for furnaces, as part of the country's plans to expand by relying on clean energy, El Kordy noted.

El Kordy pointed out that over EGP 1.3 billion were invested in the fields of development, replacement, renewal, and support for safety and environmental protection systems in light of the ministry's strategy in this regard.

These investments were also used for establishing new warehouses for diesel, jet fuel and others, as well as the comprehensive development of current production units, digital transformation projects for the application of resource and asset management systems, and linear programming for petroleum refineries.

CHI TAKES OVER EOG COMMITTEE LEADERSHIP

The Egypt Oil & Gas (EOG) Committee announced the appointment of David Chi, Vice-President of Apache Corporation and Country Manager for Apache in Egypt, as the Chairman of the committee.

This announcement was made during the opening of the 4th Upstream Technical Convention which is organized by the Egypt Oil & Gas group.

Chi Succeeded Sameh Sabry, Senior Vice President and Managing Director of Wintershall Dea. Sabry led the committee for 15 months where he supported the committee's vital presence in the oil and gas sector. Among the committee's significant achievements under Sabry's leadership was the launch of the unified Ramdan HSE Campaign and COVID-19 response plan.

During his opening speech, Chi thanked Sameh for his efforts during the challenging time of the pandemic. "It was a very challenging time. He has accomplished a lot. you should really be proud of your efforts" Chi said.

Additionally, Chi thanked Mohamed Fouad, the CEO of Egypt Oil and Gas, and his team for their support to the committee.

The new Chairman praised the efforts of the committee describing it as the best platform to bring the industry together. "It is a great place to communicate, collaborate and tackle common challenges together."

Chi added, "The Egypt Oil and Gas Committee can be a great ambassador for the Egypt oil and gas industry and share the success we have under the leadership of His Excellency Engineer Tarek El Molla."

The EOG Committee was established in 2012 seeking to unify the industry's voice and to work in parallel with the government to enhance the well-being of the petroleum industry. It brings together exploration and production companies, service companies, government entities, and leading industry experts under one roof to address the challenges the industry is facing and to find potential solutions.

David has been the Vice President of Apache Corporation and Country Manager of Egypt since May 2016. Prior to this role, he held the position of General Manager and Managing Director of Qarun Petroleum Company after his arrival in Egypt in 2014. David transferred to Cairo from his role as Country Manager and Interim Region Vice President of Argentina and has held various management positions with Apache in Argentina and Houston.

Chi has served on several boards, including Executive Vice President of the Board of Governors for American Chamber of Commerce in Egypt. He is also the Chairman of the Board and President of Springboard Girls Schools, a nonprofit organization founded by Apache that focuses its efforts on educating girls in rural areas of Egypt. In addition,

EGYPT OIL & GAS COMMITTEE

David is a member of the Industry Advisory Board of Petroleum Engineering at the American University in Cairo, a Trustee in Cairo American College's Board of Trustees, and as board member for several companies.

UOG

PRODUCTION FOR UNITED OIL & GAS AVERAGES AT 2,022 BOE/D IN Q3 2021

United Oil & Gas PLC (UOG) announced that its production in Q3 2021 averaged at 2,022 barrels of oil equivalent per day (boe/d).

Furthermore, from January 1st to September 30th, average production reached 2,491 boe/d, thereby meeting the production guidance for 2021 of 2,100-2,300 boe/d.

It is worth noting that all the production for the period was from United's 22% non-operating interest in the Abu Sennan Licence operated by Kuwait Energy Egypt (KEE).

UOG TO TEST ASX-1X WELL IN ABU SENNAN

United Oil & Gas Company PLC (UOG) announced that the ASX-1X exploration well at the Egyptian Abu Sennan license reached a total depth of 4,272 meters ahead of schedule.

The well encountered at least 10 meters net pay in several oil-bearing reservoirs, including targets at the Abu Roash Formation.

Evaluation of the well data is continuing, and a comprehensive plan for testing and completing the well is now planned. If successful, this will be followed by an application to the Egyptian General Petroleum Corporation (EGPC) for a development lease.

"Today's announcement is the fourth positive well result from Abu Sennan in 2021. With the well testing set to begin shortly, we look forward to understanding the full potential of the ASX-1X well," UOG's CEO Brian Larkin said. "Plans are continuing to progress on finalizing the additional development well that has been added to the 2021 drilling program. The continued investment in Abu Sennan by the JV partners is a testament to the potential which exists within the license, and we look forward to updating shareholders as we receive further results from the continuing 2021 campaign."

DANA GAS

DANA GAS COLLECTIONS IN EGYPT REACH $125 M IN 2021

Dana Gas PJSC announced that within the first nine months of 2021, its gas collections from Egypt have reached $125 million, which is a 136% increase compared to the same period in 2020 when it only reached $53 million.

On this occasion, Patrick Allman-Ward, CEO of Dana Gas, said: "We are pleased with the improvement in our collections this year, which have been supported by a strong rebound in commodity prices. Continuing timely payment of invoices and the settlement of outstanding receivables is key to providing us with the confidence to carry on with our expansion plans in the KRI and Egypt."

SDX ENERGY

SDX ENERGY SPUDS MSD-21 WELL IN EASTERN DESERT

As part of a 12 well development campaign, SDX Energy started the initial drilling of the MSD-21 infill development well on the Meseda field in Egypt.

This well is the first, in a fully funded, 12 well development campaign on the Meseda and Rabul oil fields in the West Gharib concession, Egyptian Eastern Desert.

The campaign aims to boost production to reach c. 3,500 – 4,000 barrels per day (bbl/d) by early 2023, compared to the current c. 2,400 bbl/d.

SDX spudded the MSD-21 development well, in which it owns 50% working interest on October 16th. The statement from SDX also elaborated that the well has a $0.9-$1.0 million gross cost to drill and tie in, and that it is expected to come online and produce approximately gross 300 bbl/d, which would have immediate effect on the Group's cash flow.

CHEIRON

CHEIRON COMPLETES ACQUISITION OF 50% OF SHELL'S WESTERN DESERT ASSETS

Cheiron Petroleum Corporation announced that it has completed the acquisition of 50% of Shell's upstream oil and gas assets in the Western Desert.

The remaining 50% of the interests will be purchased by Cairn Energy PLC, Cheiron's strategic partner.

The acquired portfolio comprises over 20 producing fields, with their associated facilities and pipeline infrastructure, coupled with future development and exploration drilling opportunities.

Cheiron will operate the producing and development concessions, leveraging its extensive mature fields development expertise, and Cairn will operate three of the exploration blocks, drawing on its international exploration experience. The field activities will continue to be managed by the Bapetco Joint Operating Company.

The consideration paid for the interests is circa $323 million (net Cheiron) with additional contingent payments of up to $140 million, depending on oil price and exploration success.

TRANSGLOBE

TRANSGLOBE EGYPT'S PRODUCTION AVERAGED AT 10,758 BOE/D YTD

TransGlobe Energy Company's output from Egypt in 2021 averaged at 10,758 barrels of oil equivalent per day (boe/d) YTD.

Production in Egypt averaged at 10,727 boe/d in Q2 2021, while it recorded an average of 11,214 boe/d during the period from September 1st to 18th.

TransGlobe is ongoing in using the EDC-64 drilling rigs for development oil wells in Egypt. "In West Bakr, during the quarter, the Company successfully drilled two development oil wells and is moving on to a third well, K-66, at quarter-end," the company said.

DRAGON OIL

DRAGON OIL EYES NEW OPPORTUNITIES IN EGYPT, IRAQ, TURKMENISTAN

Dragon Oil Company is looking forward to implementing new developments in Egypt, Turkmenistan, and Iraq after surviving the challenges of 2020.

"At Dragon Oil, we are determined to achieve our sustainable growth targets through unlocking new opportunities around the world, including Turkmenistan, Iraq, and Egypt. The board has put a strategy for us to increase production from 160,000 barrels per day currently to 300,000 b/d by 2026," Dragon Oil's CEO Ali Rashid Al Jarwan noted.

TECHNIP ENERGIES

TECHNIP ENERGIES, NPCC SIGN MOU TO ENHANCE ENERGY TRANSITION IN UAE

Technip Energies announced that it has signed a Memorandum of Understanding (MoU) with National Petroleum Construction Company (NPCC) to provide support for the United Arab Emirates' (UAE) energy transition, in addition to other countries in the MENA region.

The agreement was signed by NPCC CEO Ahmed Dhaheri and Technip Energies CEO Arnaud Pieton at the GASTECH conference, with senior officials of both companies present.

According to Technip Energies' statement, the scope of cooperation involved in this new agreement will include blue and green hydrogen decarbonization projects and CO2 capture. This collaboration will also include various industrial projects in areas, such as waste-to-energy, biorefining, biochemistry, ammonia, and much more.

HALLIBURTON

HALLIBURTON LAUNCHES ISTAR™ INTELLIGENT DRILLING AND LOGGING PLATFORM

Halliburton announced the release of the iStar™ Intelligent Drilling and Logging Platform, a cutting-edge measurement platform that features multiple services offering enhanced control of drilling and logging operations.

The platform provides optimized subsurface insight, superior drilling performance, and consistent well delivery through its digital architecture. This platform gives professionals real-time visibility of the type and quantity of reservoir fluids, using a data science approach to improve well placement and enhance reserves calculations. Additionally, the integrated drilling dynamic and continuous well-positioned measurements help maximize the rate of penetration.

It should be noted that operators have run iStar services in several locations across the Middle East, Europe, and North America.

CHARIOT, HALLIBURTON AGREE TO COOPERATE ON MOROCCO'S ANCHOIS GAS APPRAISAL WELL

With the signing of a binding letter of intent, Chariot Oil and Gas company announced that it will work together with Halliburton on Chariot's planned Anchois gas appraisal well within the Lixus license, offshore Morocco.

In accordance with this agreement, Halliburton will provide full range of different services to Chariot, including project management services, directional drilling and logging whilst drilling services, drilling fluids materials and engineering services, cementing, pumping, materials and engineering services, wireline logging services, and drill bits and coring services.

BAKER HUGHES

BAKER HUGHES, LYTT JOIN FORCES TO ACCELERATE DIGITAL TRANSFORMATION OF OIL, GAS ACTIVITIES

Baker Hughes, LYTT announced that they will work together to help accelerate the digital transformation of the oil and gas sector through applying distributed sensor networks within the wellbore.

These networks will help provide experts with the data that they need to enhance productivity on the oil and gas fields.

This will occur by combining LYTT's fiber optic data analytics and cloud-based software with Baker Hughes' completions and well intervention hardware and service expertise. According to the statement, the digitization will enable remote monitoring needed to reduce the health, safety, and environmental risks involved in all operations.

BAKER HUGHES, MHWIRTH COMPLETE SUBSEA DRILLING SYSTEMS MERGER

Baker Hughes has completed its Subsea Drilling Systems business (SDS) merger with Akastor ASA's subsidiary MHWirth AS (MHWirth), forming a global offshore drilling equipment company called HMH.

With both companies in the merger having equal equity in HMH, the newly formed company will have the ability to combine skills and expertise in the field, enabling them to offer a wide range of world-class offshore drilling equipment products and packages.

In its mission to support the industry's transition towards energy-efficiency, HMH also seeks to play a pivotal role in making the industry more competitive, through optimizing drilling efficiency and its use of innovative technologies and service solutions.

BAKER HUGHES, SABIC JOIN FORCES IN STRATEGIC FRAMEWORK ALLIANCE AGREEMENT

Bently Nevada, a Baker Hughes business, has finalized a strategic framework alliance agreement with Saudi Basic Industries Corporation (SABIC) to supply asset performance management services.

The agreement will involve Bently Nevada's provision of plant-wide condition monitoring and machine asset protection services. This will include over 1,200 assets at more than 16 SABIC sites inside Saudi Arabia.

The alliance with SABIC will deliver localized maintenance, support, and direct access to Bently Nevada's full range of hardware, software and services, which includes the System 1 platform.

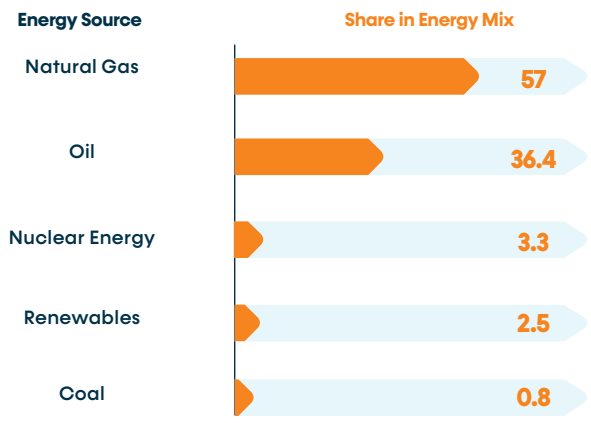
OVERVIEW OF EGYPT'S RENEWABLE ENERGY SECTOR

BY AMINA HUSSEIN, REHAM GAMAL, AND TASNEEM MADI

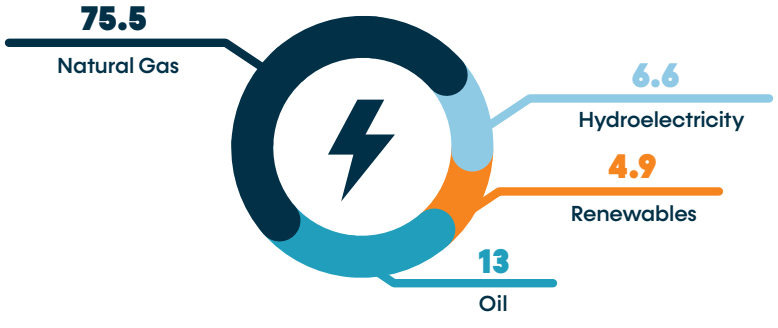
ENERGY MIX OVERVIEW

1. EGYPT'S ENERGY MIX

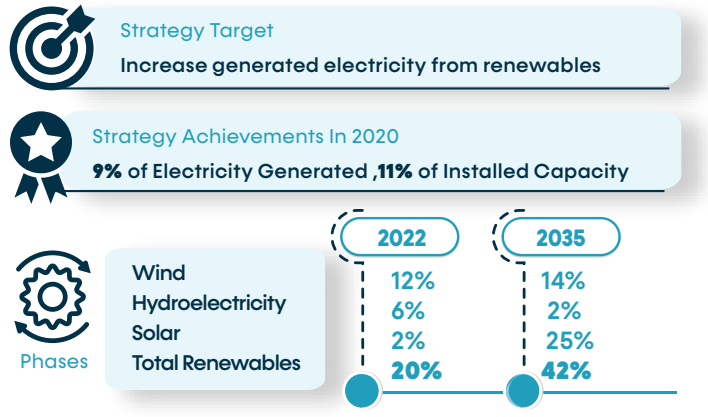
ENERGY BREAKDOWN (%)



ELECTRICITY GENERATION BREAKDOWN (%)

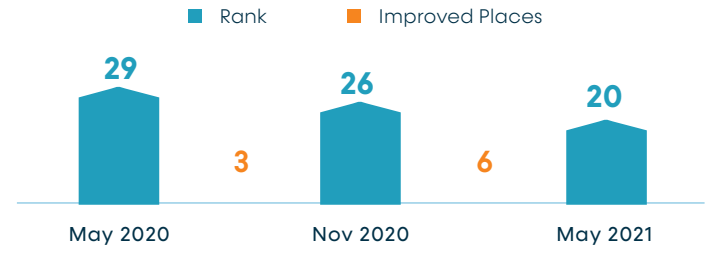


EGYPT'S 2035 INTEGRATED SUSTAINABLE ENERGY STRATEGY (ISES)



2. RENEWABLE ENERGY COUNTRY ATTRACTIVENESS INDEX (RECAI)

EGYPT'S RANKINGS DEVELOPMENT IN RECAI*



*Issued in 2020 & 2021

RENEWABLE ENERGY MARKET FRAMEWORK

1. OVERVIEW OF RENEWABLE ENERGY SUPPORT POLICIES, LEGISLATION AND REGULATIONS

MAIN LEGISLATIONS AND REGULATIONS

- Law No. 102 of 1986, establishing NREA*
- Cabinet Decree No. 1947 of 2014 on Feed-in Tariff
- Constitution of Egypt, 2014 (Article 32)
- New Electricity Law No. 87 of 2015
- Renewable Energy Law, Decree Law 203/2014
- Investment Law No. 72 of 2017

*Amended in 2015

Common Target

Creating a favourable environment to increase renewable energy investment

2. INVESTMENT MECHANISMS

LEGISLATIONS & POLICIES TO DEVELOP RENEWABLE ENERGIES*

- Tenders
- Feed IN-Tariff
- Net Metering
- Build-Own Operate Projects (BOO)
- Auctions
- Independent Power Producers (IPP)

*According to Law No. 203 of 2014

3. REGIONAL AND INTERNATIONAL COOPERATION

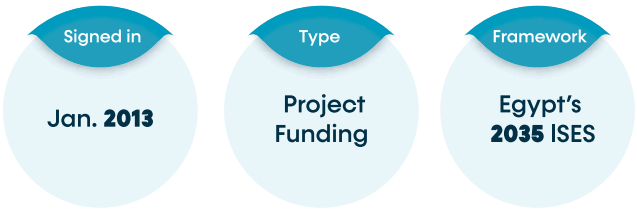
Major Mutual Initiatives with IRENA

- Renewables Readiness Assessment
- Remap Reports

EGYPT AS A PART OF ISA FRAMEWORK AGREEMENT

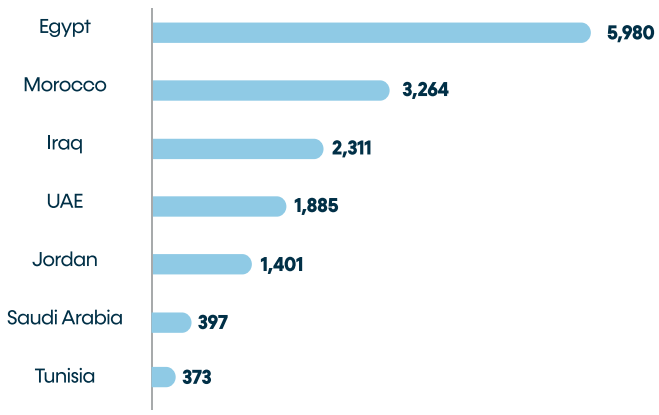
- **Signed in** Mar. **2018**
- **Ratified by** **68** countries
- **Aim** Address common challenges to the scaling up of solar energy

EGYPT-EU MUTUAL AGREEMENT



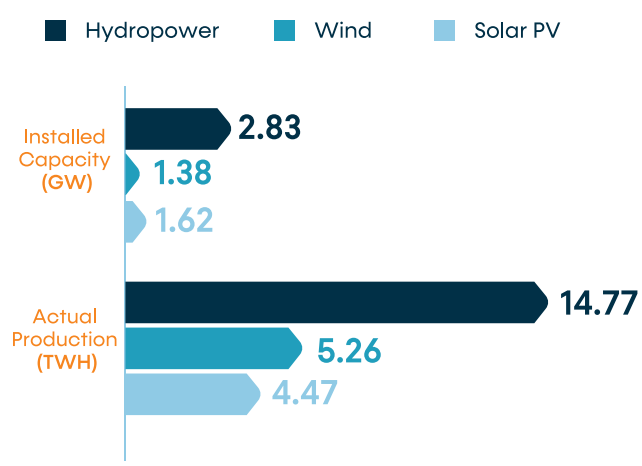
RENEWABLE ENERGY & ELECTRICITY GENERATION

ARAB COUNTRIES RENEWABLE ENERGY GENERATION IN 2020 (MW)



RENEWABLE ENERGY INSTALLED CAPACITY & ACTUAL PRODUCTION IN FY 2020/21

INSTALLED CAPACITY & ACTUAL PRODUCTION BY SOURCE IN FY 2020/21



RENEWABLE ENERGY SHARE IN ELECTRICITY CAPACITY & GENERATION IN 2020 (%)

RENEWABLE POWER PROJECTS

ZAFARANA WIND PARK IN THE GULF OF SUEZ

Current Capacity

545 MW

Benefits

Annually produce: **90,000** MWH

Avoid: **50,000** t of CO2 emissions

Save: **18,000** t of oil

THE BENBAN SOLAR ENERGY PROJECT

Implemented	**2015**
Partners	**40** energy companies
Location	Aswan
Area	**37** km²
Projects	**32**
Capacity	**1.8** GW
Investment Cost	EGP **40** billion
Stations	**4** electricity transmission **> 40** solar sub power plants
Project's Main Target	Produce **2000** MW **90%** of the High Dam production

INSTALLED CAPACITY FOR UNDER CONSTRUCTION RENEWABLE PROJECTS (MW)

SOLAR PV	**213**
WIND	**250**
	120, BUILT BY NREA

REFERENCES

- ARAB PETROLEUM INVESTMENTS CORPORATION **(APICORP)**
- BP
- INTERNATIONAL RENEWABLE ENERGY AGENCY **(IRENA)**
- NEW & RENEWABLE ENERGY AUTHORITY **(NREA)**
- RENEWABLE ENERGY COUNTRY ATTRACTIVENESS INDEX **(RECAI)**

CHEIRON'S NEW ACQUISITION: A TROVE OF EXCITING OPPORTUNITIES

AN INTERVIEW WITH **DAVE THOMAS**, CHEIRON'S CEO

How will your acquisition of the Western Desert assets from Shell affect the company's position in the Egyptian market?

Following the acquisition of Shell's onshore assets, Cheiron's operated production in Egypt has increased to over 130 kboepd, establishing us as one of the four biggest E&P operators in the country. The acquisition has also diversified our asset portfolio and created a long term, core investment area for the company in the Western Desert, to complement our existing Gulf of Suez and emerging Nile Delta positions.

This change of scale has opened up many ways for us to add value including new exploration and development opportunities, technology transfer, the identification of operational synergies and various other initiatives. We have also built some important new relationships with the Bapetco joint operating company (JOC), our joint venture partners, crude oil traders and within the financial community.

Most importantly, though, the change brings a sense of increased responsibility. The Government has placed its trust in Cheiron and Cairn, our strategic partner in the acquisition, to increase the pace of investment across the Bapetco portfolio and build production quickly to help meet the country's energy needs. We are committed to do just this.

What attracted you to this investment at such a time?

Cheiron (previously known as PICO) has been in the upstream business in Egypt for more than 30 years and has grown steadily through a series of targeted mature field acquisitions, coupled with some notable development and exploration successes.

Over these years, the company has built up considerable expertise in mature field management techniques in the Gulf of Suez and, most recently, in the Western Desert, where we have added over 50% to the production from the North Bahariya fields since taking over operatorship in 2017.

Hence, when Shell's onshore portfolio came on the market it was a natural fit with our company's investment strategy and operating capabilities. Then, as we looked at the assets in more detail, we became convinced that the concessions have significant remaining upside potential which can be realized through a combination of infill drilling, workovers, waterflood optimization, facilities debottlenecking and near field appraisal and exploration activity. There are also capital, operating and G&A cost savings to be captured.

Another important attraction was the opportunity to work with the Bapetco organization, which is one of the most capable and pre-eminent JOCs in Egypt, and this gave us confidence that the assets were being managed safely and effectively.

What are your E&P plans for these assets in the coming 5 years?

The next few years are going to be exciting.

Our ambition is to return Bapetco's gross production to around 120 kboepd over the next year or so (levels not seen on a sustainable basis since 2018) and, with a reasonable level of appraisal and exploration drilling success, we believe production can be increased even higher.

To achieve this, we will be investing quickly in the assets and, with EGPC's, Bapetco's and our Partners' support, we plan to increase the drilling rig count in the fields from 2 to 5 by early next year and bring in additional workover units.

In the current business environment, we can easily envisage sustaining this level of rig activity over the next five years and completing well over 200 new wells during this period.

Initially, the rigs will be mainly focused on infield and near field opportunities but, in the second half of 2022, one of the rigs will move to drill exploration wells in the three new exploration concessions which we acquired as part

> *"WE ARE ALWAYS PLANNING FOR THE FUTURE AND I WOULD NOT RULE OUT THE POSSIBILITY OF FURTHER ACQUISITIONS SHOULD THE RIGHT OPPORTUNITY ARISE, PERHAPS ALLOWING US TO CONSOLIDATE OR TAKE ADVANTAGE OF SYNERGIES WITH OUR EXISTING FIELDS."*

of the asset portfolio. These three blocks are operated by our partner, Cairn, and have some good exploration potential.

Alongside the rig program, we will be performing various facilities related projects, including the tieback of undeveloped gas discoveries to the existing infrastructure and debottlenecking some of the facilities and flowlines.

Beyond this, Cheiron has a very strong focus on safety and the environment and, more broadly, the global sustainability agenda.

Bapetco's safety record is very good and we will be looking to help the organization continue or, if possible, even improve on their historic level of performance.

From an environmental perspective, we will be implementing a number of initiatives designed to reduce Green House Gas Emissions through the elimination of flaring and venting and minimizing the use of diesel fuel for power generation. Another focus area will be enhancing the produced water disposal arrangement for all the fields.

Can you highlight some of the factors which can make a successful mature field operator?

In the Egyptian operating environment, I think the key is being able to work closely with the JOC management teams to create a common vision and motivate staff and contractors to continually find ways to improve the business.

It is also critically important to maintain a strong focus on HSES performance, which requires real commitment, coupled with appropriate policies, procedures and standards and the discipline to consistently apply them. This is true for any E&P operation, but particularly so for mature field operations where the infrastructure is often relatively old and failure risks can be higher.

A large part of the solution is to have good asset integrity management systems in place, including appropriate audit and inspection processes and rigorous preventative maintenance programs.

Once these fundamentals are there, one can start to think about the opportunities to add value through further reservoir development investments, the application of new technologies and streamlining work, contracting and procurement processes.

Finally, there has to be an exceptionally tight focus on cost control throughout the operations, but this also has to be balanced with a recognition that certain investments must be made for safety or environmental reasons or to deliver longer term operational efficiency.

> *"CHEIRON HAS A VERY STRONG FOCUS ON SAFETY AND THE ENVIRONMENT AND, MORE BROADLY, THE GLOBAL SUSTAINABILITY AGENDA."*

Could you highlight some of the latest technologies and techniques that Cheiron applies in its assets?

We always try to keep abreast of any new technologies which can be used on our various fields and have seen some interesting new applications over the recent years.

For example, we have started to use composite pipelines in Norpetco and South Ramadan field operations, significantly reducing installation and procurement costs and improving the long-term operability of the flowlines.

On the drilling front, we are using remote real time data monitoring to help manage the operations and have been deploying some state-of-the-art directional drilling tools supported by our contractors. Advances in the remote monitoring and control of drilling tools means that it is now possible to drill directional wells without any specialist directional drilling support at the well site and this is an area we are keen to look into.

Other very interesting technologies we are actively using, and which are worth highlighting, include the use of artificial intelligence for seismic data interpretation and nano technology for EOR applications in Mexico.

> *"WITHIN THE OIL & GAS INDUSTRY, THE MINISTRY, EGPC, EGAS AND GANOPE ARE ALWAYS READY TO DISCUSS ISSUES AND FIND PRAGMATIC SOLUTIONS TO HELP PROMOTE INVESTMENT AND GROW THE COUNTRY'S PRODUCTION"*

Do you have any near-term plans for other acquisitions in Egypt or Internationally?

Cheiron's main business priorities in Egypt today are to support Bapetco to safely deliver the full potential of the new asset portfolio, progress our three other existing strategic growth projects (the Geisum GNN oil field development, the WEB gas field development and the North Bahariya waterflood) and maximize the production volumes levels from all our fields. Having said this, we are always planning for the future and I would not rule out the possibility of further acquisitions should the right opportunity arise, perhaps allowing us to consolidate or take advantage of synergies with our existing fields.

Beyond Egypt, Cheiron currently operates in two other countries, namely, Mexico and Romania. Naturally, the recent acquisition of Shell's Western Desert assets has greatly increased our in-country focus but in the fullness of time, as the company grows, we may come to consider further international ventures.

How encouraging do you find the business atmosphere in Egypt currently?

In two words - very encouraging. From a macroeconomic perspective, under the stewardship of a Government driving to balance business incentives with social considerations, the Egyptian economy has been able to withstand the hardships imposed by the Covid-19 pandemic better than most others. With the sustained progress made over the past several years on the economic reforms, inflation is largely under control, foreign reserves are stable and GDP, which remarkably stayed positive last year, is fair set to grow.

Within the Oil & Gas industry, the Ministry, EGPC, EGAS and Ganope are always ready to discuss issues and find pragmatic solutions to help promote investment and grow the country's production. This approach, coupled with the stable fiscal and regulatory framework and hydrocarbon potential in the country, means that Egypt continues to be a very attractive investment area for the industry. This is clearly demonstrated by the recent entry (or return) of some of the Majors, the level of interest in the bid rounds, the active secondary asset market and the number of new projects related to the "Energy Hub" vision.

What is the basis upon which Cheiron defines its strategic priorities and capital allocation?

Our key strategic priorities are developed during Shareholder and Board discussions and cover areas such as the company's growth ambitions, investment focus areas, technology strategy, risk management processes, approach to sustainability issues and people development. Once this framework is set, our capital allocation process is very conventional and relies on economic screening to high grade the investment opportunities, coupled with various types of risk assessments depending on the investment under review.

REDRESSING THE BALANCE:
DEVELOPMENT PLANS & EMISSIONS REDUCTION

BY YARA ALY

Realizing that energy security and carbon neutrality should be two sides of the same coin, Egypt has linked national development plans, especially those concerning energy transition and energy efficiency (EE), with carbon reduction opportunities. Notably, the move comes within the framework of Egypt's vision for 2030, which reflects the country's long-term strategic plan to achieve the Sustainable Development Goals (SDGs).

ENERGY TRANSITION

In its effort to align with SDGs, the government decides to increase the share of natural gas in the energy mix. Policy-makers recognize that utilizing Egypt's abundant natural gas could, in addition to fostering economic growth, make a significant contribution towards reducing carbon footprint. Accordingly, a new natural gas law was issued in August 2017, laying the foundation for the development of a competitive gas market.

The law gradually decentralizes the Egyptian gas market and opens it up for private investment in trading, storing, selling, and distributing natural gas. Furthermore, under the law, private companies pay a set fee for the use of public transit facilities and pipelines. Profits earned from these fees are used to expand existing pipelines and encourage investments in gas infrastructure and transportation networks. To illustrate, the government extends and develops the natural gas grid to connect more residential, commercial, industrial units throughout the country. Considering that burning natural gas yields fewer carbon emissions than burning coal or petroleum, the transition to natural gas has accounted for much of the decrease in carbon emissions. With this, the country manages to supply energy in line with economic developments and environmental needs

Moving to transportation networks, Egypt has dedicated a whole pillar for sustainable transport in its carbon emission mitigation strategy since the transport sector generates a large share of carbon emissions. Emissions from transportation primarily come from burning fossil fuel; namely, gasoline and diesel. With an aim to mitigate such impacts, the government starts taking the necessary policy reforms and measures which include fuel switching to low carbon alternatives, upgrading of vehicles fleet and engine tuning.

As an illustration, the government joins forces with private sector to commercialize natural gas vehicle conversions (NGVs). Not only do NGVs industry contribute to reducing carbon emissions, but it also has a high economic return. Compared to diesel, Natural gas is inexpensive and environment friendly. A primary key to the NGV industry success in Egypt is the package of financial incentives offered by the government including 5-year tax holidays for natural gas companies, low-cost conversion charges for car owners, and attractive price differential between natural gas and gasoline. In similar fashion, the government launched a parallel initiative entitled "Vehicle Scrapping and Recycling Program". Through this program, obsolete vehicles are replaced by newer ones with dual-fuel engine. In addition to the use of natural gas as a clean alternative fuel, the new cars are equipped with modern catalytic converters which increase fuel efficiency. Thanks to the Vehicle Scrapping and Recycling program, 310,000 tons of carbon emissions were avoided between 2013 and 2017. With that, energy efficiency can also deliver robust emission cuts.

ENERGY EFFICIENCY

The degree to which efficiency improvements can limit energy demand growth is one of the main distinguishing characteristics of carbon reduction pathways. With this in mind, Minister of Petroleum and Mineral Resources (MoP), Tarek El Molla, scales up action on energy efficiency to mitigate climate change. For instance, El Molla endorsed the World Bank Initiative "Zero Routine Flaring by 2030". The initiative aims at reducing gas flaring at oil production sites. Flaring of gases, in addition to economic losses, increase carbon emission significantly. knowing that gas flaring is mostly found in refineries, some measures were taken to improve the efficiency of the energy consumption in refineries with a total savings of about EGP 300 million annually.

As for EE projects, the ministry aims to implement low-cost EE projects through introducing new technologies, system optimization, and full energy audits. In cooperation with the European Bank for Reconstruction and Development (EBRD), two EE grant studies were conducted: the Suez Oil Processing Company's (SOPC) Full Energy Audit and the System Optimization and GASCO's Waste Heat Recovery. In a nutshell, the energy transition strategy, along with energy efficiency, enables Egypt to manage carbon emissions.

CARBON CAPTURE POTENTIAL IN EGYPT

BY RANA AL KADY

To begin with, it can be noticed with the increasing oil and gas activities, that there has been an exponentially large amount of greenhouse gases (GHGs) that have been emitted into the atmosphere. This particular phenomenon adheres mostly to Carbon Dioxide (CO2) emissions. With that, the technique of trapping CO2 produced during power production and industrial operations and preserving it so that it is not released into the environment is known as carbon capture and sequestration/storage (CCS). CCS technologies offer a lot of promise for lowering CO2 emissions in energy systems. CCS-equipped plants can collect nearly all of the CO2 that is emitted.

OVERVIEW

First of all, for context, as per the Global CCS Institute's 2019 Status Report, 40 million metric tonnes (mmt) of CO2 are collected and stored annually in facilities that are fully operational or under development. The oil and gas sector, alone, is responsible for a large proportion of the world's total CO2 emissions. Today, indirect greenhouse gas (GHG) emissions from oil activities total about 200 million tonnes (Mt) of carbon dioxide equivalent. Such pollutants, which do not include any pollutants related to real gasoline use, account for around 15% of the energy sector's overall GHG emissions.

In the case of gas, indirect emissions account for between 15% and 40% of the total emission levels during its whole service life. This indicates that about 97 percent of today's gas has substantially lower emission levels than coal. Nonetheless, instead of focusing on the difference between coal and gas, the goal for the foreseeable future should be to concentrate on cost-effective solutions to bridge that gap between gas and zero-carbon technologies. As per a Renewable Energy Expert who preferred anonymity, "the carbon capture is a new technology idea that is becoming very popular in the UK and in the West, but the Middle East still did not consider how important this idea is." The Renewable Energy Expert continued by stating that, "Carbon capture technologies are needed in Egypt especially because of the high amount of carbon and greenhouse gases that exist, especially from the oil and gas industry and the transport industry."

CARBON CAPTURE TECHNOLOGY

CCS is the process of capturing, transferring, and storing greenhouse gas emissions from fossil fuel sources, energy-intensive businesses, and gas reserves before injecting them down into the earth. CCS is being suggested in a variety of applications. However, this data sheet concentrates on CCS related to conventional energy facilities.

CO2 may be captured at the source – the facility generating CO2 – using a variety of technologies. Furthermore, post-combustion carbon capture (the most common approach in current power plants), pre-combustion carbon capture (often used in industry applications), and oxy-fuel combustion systems are the three types. CO2 is extracted from the output of a combustion chamber for post-combustion carbon capture. Industrial facilities employ commercially accessible pre-combustion capture technology; nevertheless, pre-combustion collection in power plants is still very much in the initial phases of implementation.

CARBON CAPTURE POTENTIAL

As per the World Bank report, air pollution costs Egypt approximately EGP 47 billion per year. To address this, a number of government-led projects aimed at reducing greenhouse gas emissions are being implemented with the help of financing and the private sector. Additional steps, however, are necessary, according to some experts and company owners, who advocate for a more extensive renewables plan, monetary incentives to expand renewables, pollution caps for the environmentally damaging sectors, and the use of greener carbon sequestration technologies.

It can be noted that while this technology is attracting a great deal of interest, there are some financial and social obstacles to overcome. For this reason, at this moment in time, CCS does not necessarily appear to be part of Egypt's plan. In Egypt, CCS remains to be an exorbitant decarbonization option, while solar and wind power are two examples of cost-competitive technologies that have become popular and accessible. Others, such as solar-powered desalination and green hydrogen, have enormous promise. This does not necessarily mean that implementing CCS technologies is not plausible, but it must appeal to the industry and the reliance on conventional fossil fuels must transition to greener technologies to ensure that CCS technologies can be viewed as a feasible technology for implementation in Egypt.

THE WAY FORWARD

There are a number of additional problems that might aid future CCS decision-making by advancing the idea of CCS's possible contribution to long-term international reduction and stability of carbon dioxide levels. These include the possibility for CCS technology adoption and implementation, as well as chances for poor nations to benefit from CCS, its implementation to biomass CO2 sources, and the interplay between CCS expenditure as well as other mitigation approaches.

Politicians, environmentalists, and the broader population must all be educated on the benefits and drawbacks of this strategy by the scientific community. Carbon sequestration is not a substitute for greater energy efficiency or the use of non-carbon forms of energy. These are, nevertheless, a vital addition since there will be reduced hardship in tackling environmental issues if so many technical choices are accessible. Additionally, a range of technologies offer lower related costs and real solutions, with the technologies chosen based on the local conditions.

To conclude, in a carbon-constrained future, governments and corporations that can legitimately demonstrate that they will be implementing steps to decrease indirect emissions might fairly contend that all these resources must be favored over higher-emission alternatives. The oil and gas sector must be engaged in reducing the environmental effect of oil and gas production in any manner feasible, and politicians must acknowledge this as a critical component of global decarbonization.

DNV

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THE PRICE TAG FOR A CARBON NEUTRAL FUTURE

BY FATMA AHMED

Global warming and climate change are among the most dangerous challenges facing the world these days and will have a negative impact in the future. In 2015, 196 parties have signed The Paris Agreement, an international treaty that aims to limit global warming to less than 2°C compared to the levels before the Industrial Revolution. This came after experts painted a gloomy picture of the future, given the increase in global temperatures.

The International Energy Agency (IEA) set a roadmap to reduce carbon dioxide (CO2) emissions during the next few decades to reach net-zero by 2050 or sooner. In order to achieve this target, enormous investments will be required, which begs the question, how much will the realization of a carbon-neutral future cost?

SOCIAL COSTS: AN EFFECTIVE TOOL FOR COST DETERMINATION

In order to calculate the costs of emissions reduction, we have to consider the social costs. According to an article published on "Carbon Brief", social costs add up all the quantifiable costs and benefits of emitting one additional ton of CO2 in monetary terms. This value can then be used to weigh the benefits of preventing global warming against the costs of cutting emissions.

This cost varies due to considering different assumptions about future emissions, such as how the climate will respond, the impacts this will cause, and the future damage assessment is conducted. A social cost is an approach that can be used for carbon pricing.

The World Bank defined carbon pricing as an instrument that captures the external costs of greenhouse gas (GHG) emissions. This includes the costs of emissions that the public pays for, such as damage to crops, healthcare costs from heat waves/droughts, and loss of property from flooding and rising sea levels. It then relates them to their sources through a price, usually in the form of a price on the CO2 emitted.

This means policymakers may face a challenge in order to decide on how much to spend on measures and technologies to reduce greenhouse gas emissions. This will take us to an important point to distinguish between two types of costs, static costs, and dynamic costs.

STATIC COSTS

An article written by Kenneth Gillingham, under the title "The Cost of Reducing Greenhouse Gas Emissions," explained that static costs focus on expenditures and emissions reduction over the life of a project. For example, suppose a government spends $20 million to establish wind farms to generate electricity, which will reduce carbon dioxide emissions by 1 million tons. The static cost of the mitigation would be $20 per ton. It is about the current costs and which is the less expensive mitigation strategy. These estimates of static costs help to inform discussions about climate policy, but they ignore that climate change is a long-term problem.

DYNAMIC COSTS

The article elaborated those dynamic costs are about how actions, if taken today, will minimize the cost of emissions reduction today and in the future recognizing that actions taken today can influence future costs. So that they are dynamic because they outlive the life of a specific project.

ESTIMATING THE COST OF EMISSION REDUCTION TECHNOLOGIES

To reach net-zero emissions by 2050, annual clean energy investment worldwide will need to more than triple by 2030 to approximately $4 trillion, according to IEA. While Morgan Stanley analysts in a report from Forbes had another viewpoint, estimating that the world will need to cut 53.5 billion metric tons of CO2 by spending $50 trillion in five key areas of zero-carbon technology to reach net zero emissions by 2050.

These areas include renewable investments that require $14 trillion. Electric vehicles are another option, which will require $11 trillion. Carbon capture storage will need $2.5 trillion, and the needed hydrogen projects will also require almost $20 trillion. The last key area is the biofuel that needs investments of $2.7 trillion.

Despite these huge needed costs, the experts have another opinion. Ahmed Maharek, Air Monitoring and Water Quality expert at the oil and gas sector, said "emission reduction measures came on a cost for adopting cleaner techniques, intensive to manufacturing sector and awareness programs on a short term, but on a long sustainable term, it has its positive impact on saving our ecosystem, people's lives and nature of living and food security."

EGYPT'S SITUATION

Egypt is one of the most populous countries in the Middle East and Africa, so it has a high vulnerability to the impacts of climate change. Azza Ghanem, Environmental Economist told Egypt Oil and Gas (EOG) that "Egypt is not one of the [largest emissions producers], while it will be highly affected badly by climate change."

According to the Egyptian Intended Nationality Contribution (INDC) report, climate change studies expected losses in crop production, especially in wheat and maize by 15% and 19% respectively by 2050, an issue which will be exacerbated by the rising sea levels caused by climate change. It noted also that 12% to 15% of the most fertile arable land in the Nile Delta is negatively affected by the rising sea levels and saltwater intrusion. Estimations indicate that if the sea level rises by 50 cm, it will have a serious impact on the Delta region. "Rising seas will not only erode shorelines and destroy ecosystems, coastal cities and towns could be displaced by rising seas," Maharek said.

This comes in addition to the fact that the tourism sector will be affected by climate change. Ghanem elaborated that high temperature would cause the coral reefs bleaching, which is one of the country's main tourist attractions. She concluded that climate change would be one of the socio-economic challenges for Egypt in the coming years. It is likely that there would be negative impacts on all economic sectors such as crop yields, water supply, transportation, and health infrastructure, in addition to the tourism sector, which is one of the important income sources. As a result, there would be huge financial losses along with unemployment increasing and health problems emerging.

Hamdy Hafez, Financial and Cost Expert, said to EOG "According to attributable reports to the world bank, air pollution costs Egypt an estimated EGP 47 billion a year."

This pushes the government to take serious steps in reducing emissions. Maharek stated that "Egypt has taken several measures to reduce carbon emissions, including the use of low-carbon energy production technologies, increasing [the] use of renewable energy, [and the] use of more-efficient fossil fuel technologies."

However, more strategies and green solutions are needed for reducing emissions in Egypt, including a carbon tax strategy. "It is time to consider an explicit carbon tax system [that puts] a price on carbon. This could generate revenues as well [and could] be used as a market mechanism to reduce emissions," Hafez said.

An article written by Deborah Lehr about carbon pricing in Egypt explained that "Egypt would create a positive incentive for firms to reduce their carbon footprint. If a company, for example, uses less than its permitted allotment, it can sell the permits to others. If not, it may have to buy extra permits. Over time, the government will reduce the number of permits available, forcing firms to reduce their emissions or pay more for the right to pollute," the article stated.

Though many may share the woes in making the necessary economic sacrifices to cut carbon emissions, the alternative is that humanity will have to pay an even higher price if emissions continue to destroy the planet's natural cycles. Global climate change is not just any natural catastrophe, after which people can just rebuild and move on. It's an existential threat that if left untamed can cause mass devastation. Putting a price tag on reducing carbon emissions may not be a simple task, but it most certainly is a necessary one.

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WORKING BY THE BOOK: ENVIRONMENTAL REGULATIONS FOR THE OIL & GAS INDUSTRY

BY ENG. MOHSEN AHMED FARHAN - DRILLING DEPARTMENT HEAD - GENERAL PETROLEUM COMPANY (GPC)

The industrial development and societal practices of the 20th century have undoubtedly had a disturbing impact on the environment of planet Earth. The wasteful use of natural resources, lack of energy sources development, and improper disposal of energy by-products poses an adverse impact on the entire ecosystem and human health. The causes may be diverse and numerous, but the problems created by the production and consumption of fossil fuels in general and petroleum in particular, represent some of the greatest concerns shared by the entire international community.

The global community will rely heavily on oil and gas supplies for the foreseeable future. The world's primary energy consumption at the end of the 20th century stood at nearly 8000 million tons of oil equivalent (mmtoe). Oil and gas represented 63% of the world's energy supply, with coal providing 27%, nuclear energy 7%, and hydro-electric 3%. The challenge is to meet world energy demands, whilst minimizing the adverse impact on the environment by conforming to current good practices.

Environmental regulation is critical to address the environmental impacts of exploration and production (E&P) in the oil and gas industry, which arise largely because of the methods employed to drill wells. As a well is drilled, drill cuttings as well as fragments of rock and mud from the hole are brought to the surface along with drilling fluids and mud used to lubricate and cool the drill bit, as well as various chemical compounds. Drilling deep and horizontal wells can produce prodigious amounts of this waste, which is generally stored in surface pits or tanks before being disposed of at or near the drilling site. Environmental regulations ensure that companies dispose this waste in an environmentally friendly way, and that complete disposal of waste and rehabilitation of the environment surrounding the well is accomplished by the time drilling is completed. In addition, environmental regulations require the operator company, as the owner, to monitor the entire life cycle of an operating well to guarantee the well is properly plugged and abandoned when it has reached the end of its life. The United States has created an effective legal framework for enforcing environmental regulations on its oil and gas industry that many countries around the world can use as a model.

The Resource Conservation and Recovery Act (RCRA) regulates solid and hazardous waste and underground storage tanks. The objective of the RCRA and other similar initiatives was to aid governments in creating their own waste disposal schemes.

Drilling waste is exempt from regulation under the RCRA. However, the RCRA does regulate temporary underground hydrocarbon storage tanks located at or near a well site and other waste associated with drilling operations (e.g., empty drums, solvents used to clean drums or trucks, waste associated with painting and sandblasting, and other solvents, chemicals, and acids used at or around drill sites).

The Clean Water Act (CWA) is the primary law governing water pollution, passed in an effort to protect the environmental integrity of waterways. The CWA does not cover drinking water, which is covered primarily by the Safe Drinking Water Act (SDWA), but it does strictly regulate what types of waste can be discharged into a waterway whether that be a wetland, lake, river, estuary, or stream. The CWA also covers the discharge of waste at any shoreline or other land if there is potential for that waste to drain or seep into a waterway or wetland.

The Safe Drinking Water Act (SDWA) is the premier piece of legislation allowing the government to regulate drinking water. The SDWA seeks to promote healthy drinking water that is free of harmful amounts of pollutants. It created the Underground Injection Control program, which regulates wastewater disposal and flow back into old/inactive wells or wastewater disposal wells resulting from the drilling process. Essentially, the SDWA regulates all oil and gas wells that involve an injection of liquids or gas, either to enhance recovery or to dispose of drilling waste, brine, or water recovered during production. The SDWA does not, however, regulate wells that are solely used for the production of oil and gas without the aid of any ongoing fluid injection to increase pressure.

The Clean Air Act (CAA) regulates major source and minor source entities that emit any of 188 separate air pollutants and is the preeminent law regulating toxic pollutants released into the air. Major source polluters are individual entities that either have the potential to emit at least 10 tons of a single toxic air pollutant per year or have the potential to emit 25 tons of two or more air pollutants during any given year. Major source polluters (such as power plants) are individually regulated and must install emission control devices that drastically reduce the amount of pollutants released into the atmosphere. The standard for these control devices is deemed to be the maximum achievable control technology. Minor source polluters emit less than the major source limits on a per-installation basis. These polluters are not required to install emission control devices unless an aggregated number of minor source polluters would collectively produce enough toxic air pollution to qualify as an aggregated major source polluter.

The Oil Pollution Act (OPA) requires oil and gas companies to implement a plan to prevent oil spills, as well as a detailed containment and cleanup plan should an oil spill occur. It also contains certain education requirements and limits the ability of certain vessels that have spilled large amounts of oil from traveling. The OPA creates a strict liability standard for any party responsible for oil spills, meaning that the spill alone rather than any showing of negligence or gross negligence is enough to incur liability. It also channels liability to certain entities involved in the exploration and production process. For instance, in offshore exploration and production activities, the holder of the drilling permit is legally responsible under the OPA for any oil spill, even if another party contributed to causing that spill. A party that is strictly liable under the OPA may bring a contribution action against a party that is not strictly liable under the OPA, but any such litigation is irrelevant for the purposes of government enforcement of the OPA.

The Toxic Substances Control Act (TSCA) allows the regulation of chemicals that pose an "unreasonable risk to health or to the environment" and also permits the regulation of new entrants into the chemical marketplace. The TSCA has not traditionally been used to regulate the oil and gas industry.

In Egypt, the government had issued environmental Law 4/1994, which regulates everything related to environmental hazards, pollutants, and protected areas. All oil and gas companies have to follow this law to avoid sanctions, penalties, or fines. Contract termination is also a possibility if their activities result in severe environmental damage.

SURFING THE WAVES OF GLOBAL CLIMATE CHANGE: WHAT PTX CAN ACTUALLY DO

BY NADER RAMADAN

With skyrocketing global temperatures, increased natural disasters, and rising sea levels, never has humanity felt the wrath of today's natural environment. Experts have pointed to global environmental and climate patterns that could spell an apocalyptic scenario if humanity seeks to continue living the way it is now. Despite the various opinions about climate change that exist within human societies, the global community is in unanimous consensus that there is a dire need for the people of the world to work together to reduce greenhouse gas emissions. As the world begins to adapt to this new reality, inventors have been hard at work trying to find new ways for human communities to live with the energy needs that they have, while leading a carbon-neutral lifestyle.

Recently, some of the cutting-edge work being done with Power-to-X (PtX) technologies has had promising results. PtX technologies are ways or processes which turn carbon dioxide and energy into useful products and materials. The first stage of the PtX process involves the conversion of water into pure hydrogen. Then carbon dioxide is used to convert hydrogen into a gas or a liquid hydrocarbon. After this process is complete, the final product can include methane, kerosene, or other types of unharmful chemical products or fuels.

If producers are looking to use surplus energy to produce a gaseous final product, then Power-to-Gas (PtG) would be more than ideal. During this process, pure hydrogen is extracted from water, then liquefied petroleum gas (LPG), methane, or other gaseous products can be produced. It's a technology that LPG producers would find lucrative with the ability to produce their fuel without demanding onsite fieldwork. From the environmentalist's point of view, PtG would be an essential component to improving the planet's atmospheric health through its use of renewable solar and wind power as an energy source.

Did you ever wonder what the future power source for transportation will be? It may not be long till passengers flying planes or enjoying a long-distance luxury cruise will get to enjoy their trip using a mode of transportation that runs on a Power-to-Liquid (PtL) technologies. This process has been proven to be ideal for the production of high energy density liquids, such as ammonia, methanol, and oxymethylene ether (OME); but it doesn't stop there!

For the production of waxes and liquid fuel, methane gas can also be used as a carbon source in a process known as Gas-to-Liquids (GTL). GTL uses the Fischer-Tropsch synthesis, which involves converting natural gas (in most cases, methane) into pure hydrogen, carbon monoxide, and carbon dioxide, producing a mixture called syngas. Syngas then goes through a process where it is purified from water, sulfur, and carbon dioxide. Having ensured that the syngas is safe from any catalyst contamination, pure hydrogen is then combined with carbon monoxide to form liquid hydrocarbons, which can then be refined so that they can be used as gasoline, fuel, or diesel. According to the US Energy Information Administration, many leaders in the global energy sector have taken full advantage of this new technology by opening GTL plants, such as Shell which has GTL facilities both in Malaysia and Qatar. Sasol also operates a GTL facility in South Africa and another one in Qatar which is operated in cooperation with Chevron. Currently, the world's GTL plants have production capacities ranging from 2,700 barrels per day (bbl/d) to 140,000 bbl/d.

PtX technologies are a potential opportunity that natural gas and fossil fuel producers can make use of to improve the environment while achieving impressive revenues, since there will always be a need for a carbon source. Though PtX technologies are widely accepted in the scientific community as something that might help realize the dream of carbon neutrality, it has still become the victim of criticism from those who have reservations about the use of fossil fuels and natural gas during any stage of the process. Many have pointed out that in order for these technologies to have a lasting effect, strict sustainability standards must be enforced. Nonetheless, experts have been diligent in reassuring environmentalists that the benefits would most certainly outweigh the costs.

With the advancement of environmental science and engineering, there's no end to the possibilities that research can explore for humanity to live a more environmentally responsible future. Though the dire need for immediate change exists, so does the will to find a solution for humanity to live a prosperous life which is in harmony with its natural environment. PtX technologies represent only one of many revolutionary changes that the scientific community has or will witness in the near future.

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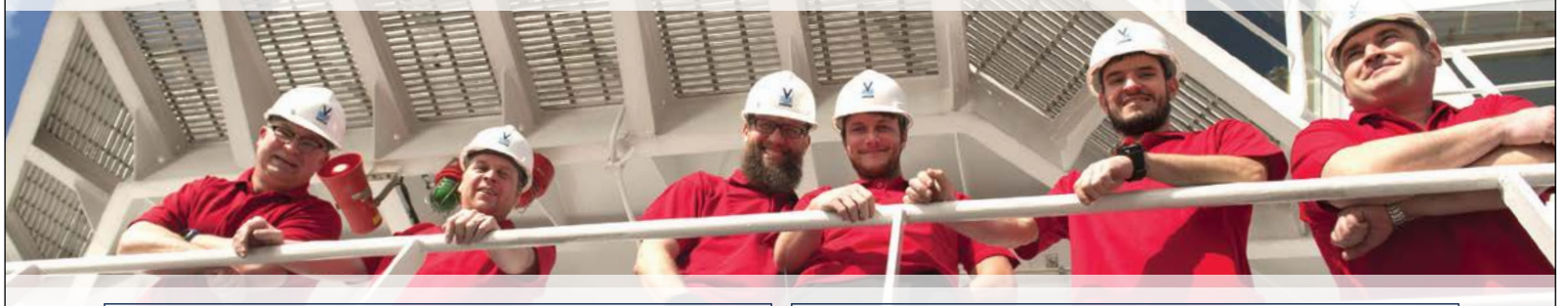

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ENERGY CRISIS: A GAME CHANGER FOR FUTURE POWER POLICIES

BY IHAB SHAARAWY

A global energy crisis is looming as European gas prices hit record highs amid tight supply and increasing demand by economies recovering from the COVID-19 pandemic.

The frenzy to secure natural gas is pushing up the prices of coal and oil, casting a shadow over efforts to mitigate climate change and even threatening to ignite geopolitical tensions.

The approaching crisis is causing central banks and investors to worry as the World Bank is warning that rising energy prices are contributing to inflation that has already been a major concern for economies that have been trying to recover from the effects of Covid-19.

Many citizens around the world must be ready for soaring energy bills. The skyrocketing energy prices are escalating costs of fertilizers and transportation of goods around the world, which will contribute to an emerging food crisis. The United Nations, meanwhile, is warning that the energy rally could also prompt more crops to be diverted to making biofuels.

According to World Bank, energy prices are expected to inch up in 2022 after surging more than 80% in 2021, fueling significant near-term risks to global inflation in many developing countries and leaving some of the world leaders struggling to secure their energy needs at any cost.

The crisis has also left experts wondering about the real causes of the energy crunch, the ways to fix it and its consequences on the future energy dynamics and efforts to reduce emissions.

GEOPOLITICAL TENSIONS

For many European officials, the energy crisis is a direct result of a geopolitical move by Russia to put pressure on the EU to approve the Nord Stream 2 Baltic Sea pipeline.

The European Commission was even looking into complaints by some EU countries that Russia is using its position as a major supplier to drive the soaring price of gas in Europe.

Although Russian supplier Gazprom has been fulfilling its sales obligations under long-term contracts, the fact that it was not adding more to match the growing demand has frustrated gas-thirsty Europeans.

Russian President Vladimir Putin refuted the Europeans accusations about weaponizing gas supplies, blamed soaring European gas prices on the past decisions by EU officials who focused on the spot gas market and opposed long-term supply contracts preferred by Russia.

Putin stressed that Russia could quickly boost natural gas supplies to the EU once German regulators allow a new pipeline under the Baltic Sea to start operation. One of the two links of the new pipeline already has been filled with gas as part of preparations for its launch to supply17.5 billion cubic meters once it is approved.

Still, many European officials see that importing 90% of the block's gas needs - much of it from rival Russia - makes it vulnerable.

However, the EU leaders struggled to agree on a common response to soaring energy prices, which have exposed rifts over the bloc's climate change goals and division on whether the price crunch requires an overhaul of EU energy market rules.

The European Commission has published a "toolbox" outlining the national measures governments can take and said Brussels would look into longer-term options to address price shocks, which seem to be more difficult to garner the consensus of the block members.

The soaring price of natural gas and shortfall in its supply were also among the key causes of an energy crisis in China. The crisis is taking a toll on the manufacturing sector in China, threatening the economy's growth for the rest of the year, which will have even greater consequences for the global economy than Europe's energy squeeze.

With Beijing striving to secure supplies, global energy markets are likely to see a bidding war for supplies of coal and natural gas, boosting prices worldwide.

A NEW REBOUND FOR FOSSIL FUELS

Away from the geopolitics conspiracy theories, there are experts who refer to a real shortage in production that requires more investments. They believe that the crisis was a result of a drop in fossil fuels investments while renewable energy hasn't proven sufficiently scalable to provide the growing needs for energy. Some analysts referred to the crisis as a backlash of the continuous attempts to demonize fossil fuels investments.

Saudi Arabia's Minister of Energy Prince Abdulaziz bin Salman sees that the spike in energy prices is a result of limited investment in hydrocarbons and infrastructure, low inventories, the lifting of pandemic lockdowns and COVID-19 vaccine uptake rates.

According to the International Energy Agency (IEA), the global energy crunch is expected to boost oil demand by 500,000 barrels per day (bpd).

The agency has made upward revisions to its demand forecasts for this year by 170,000 bpd, or a total addition of 5.5 million for the year, and by 210,000 bpd in 2022, or a total addition of 3.3 million.

An upsurge in demand in the past quarter led to the biggest draw on oil products stocks in eight years, it said.

Prince Abdulaziz said the world must pay attention to energy supply security, which should not be compromised in the fight against climate change.

Speaking to CERA Week India Energy Forum, OPEC Secretary General Mohammad Barkindo, referred to surging energy prices and said "not tackling energy affordability, energy security and reducing emissions at once could lead to unintended consequences."

"We need a diversified energy mix, cleaner and more efficient technological solutions, and a stable, inclusive, just and equitable energy transition," he said while insisting that "the oil and gas industry can and must play a key role."

While Qatar, the world's largest seller of liquefied natural gas (LNG), told consumers it was powerless to cool energy prices, US President Joe Biden blamed the current high oil prices on OPEC withholding supply.

However, Biden dismissed the idea that he might try to persuade the producer group and namely Saudi Arabia to increase production.

"I must tell you, I don't have a near-term answer," said Biden. The US President is siding with the advice of the International Energy Agency to boost clean energy spending considerably, rather than increase production in fossil fuels to address this mismatch between energy supply and demand on a long-term.

Despite calls for OPEC and its allies to ramp up production, the group has only gradually increased output sidelined in early 2020. They seem content to let oil prices remain elevated.

Therefore many experts see the credibility of the Bank of America's warning that a cold winter could lift Brent crude to $100 a barrel.

CLIMATE AMBITIONS UNDER THREAT

The International Energy Agency has warned that reigniting demand for oil is posing a threat to the world's climate ambitions

The energy watchdog said the shortage in gas and coal across the biggest economies could trigger a faster-than-expected rebound in the oil market and drive demand to above pre-pandemic levels as soon as next year.

The IEA's executive director, Fatih Birol, has warned that a sharp rise in oil and coal demand could spell the second largest increase in CO2 emissions in history because governments had not seized the opportunity for a "green recovery" from the pandemic.

In its annual World Energy Outlook, redesigned this year as a "guidebook" for world leaders attending the summit in Glasgow, the IEA predicted that carbon emissions would decrease by just 40% by the middle of the century if countries stick to their climate pledges.

Many observers were concerned that the squeeze in energy markets and the resurgence of coal may cast a shadow over efforts to curb emissions when 200 countries meet at the climate change summit, known as COP26, in Glasgow, Scotland.

COP26 organizers have set a target for the summit to "consign coal to history" in order to limit global warming to 1.5 degrees Celsius compared to pre-industrial levels.

However, pressures imposed by the prices spike may stall the momentum toward such actions.

METHANEX EGYPT ANNOUNCES THE EARLY SETTLEMENT OF ITS JOINT VENTURE FINANCING FACILITY

Cairo – 7 November 2021 - Methanex Egypt announced the full and early settlement of all remaining debt on the EMethanex Joint Venture project financing facility on 30 September 2021. This brings to close a US$ 530 million financing facility after a 15-year collaboration with an international and local banking consortium made up of 15 international and two local banks led by MUFG Bank, Ltd who served as the Global Facility Agent. This financing facility enabled the company's US$ 1 billion investment in Damietta, where Methanex operates the only methanol production plant in the country.

"This is an important milestone for our business in Egypt and a testament to the successful collaboration between and amongst Methanex Egypt's partners and the international and local banking consortium. Throughout the years, and despite the economic challenges following the start-up of our methanol plant in Damietta in 2011, we fully met all loan commitments. EMethanex represents an outstanding model for project financing and joint venture success that the Egyptian Oil & Gas and Petrochemicals sector and the Egyptian business community could benefit from replicating," said Methanex Egypt Managing Director Mohamed Shindy.

"This milestone maximizes the significant value we have and will continue to deliver to our partners, shareholders, employees and the community," Mohamed Shindy added.

The project was led by MUFG Bank, Ltd and included Crédit Agricole Corporate and Investment Bank, Standard Chartered Bank, Arab Petroleum Investments Corporation (APICORP), Arab Banking Corporation B.S.C, Bayerische Landesbank, Europe Arab Bank plc, Export Development Canada, Gulf International Bank B.S.C., HSBC Holdings plc, ING Bank N.V., KBC Group N.V., Mizuho Bank, Ltd, NATIXIS, Commercial International Bank (Egypt) S.A.E, National Bank of Egypt (Egypt) S.A.E, in addition to European Investment Bank. Emethanex was represented internationally by Slaughter and May and locally by Zulficar & Partners while the lenders were represented internationally by Freshfields Bruckhaus Deringer LLP and locally by Baker McKenzie - Helmy, Hamza and Partners.

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SCHLUMBERGER MARKS BREAST CANCER AWARENESS MONTH

BY FATMA AHMED

On the occasion of Breast Cancer Awareness Month, Schlumberger launched its annual breast cancer awareness hybrid event in collaboration with the As-Salam International Hospital on Thursday, October 28. The event, which was hosted by Schlumberger Connect Women Egypt chapter, aimed to underline the importance of early detection of breast cancer and spread awareness about how to deal with this disease.

Heba El-Karrar, Marketing, Communication and Stewardship Lead at Schlumberger Egypt and East Mediterranean, opened the session expressing her pleasure for presenting the event. "We've held this event every year for the last five years, and will continue to repeat it annually to help spread knowledge and awareness about Breast Cancer," El-Karrar said.

On the same context, Sherif Bayoumy, Managing Director Egypt, Sudan and East Mediterranean GeoUnit at Schlumberger, who joined the session virtually, opened his speech highlighting that "we have this session every year in Egypt to primarily to remind ourselves and our beloved ones of the importance of the early detection of such disease." Bayoumy pointed to the successful campaign that Schlumberger has launched to deal with Covid-19.

Additionally, Bayoumy said that "we started from a bottom line of approximately 10% of our Egyptian employee population vaccinated, [while] today we [have] almost 70%. Our target is to reach 100% by Q4 to be in line with the government's and Ministry of Petroleum's directions." He also stated that the breast cancer awareness event may be put as a part of Schlumberger reginal health and safety program.

Ij Isikaku, Human Resources Manager at Schlumberger for Egypt, Sudan and East Mediterranean, said that this event is a good platform for such a topic and a great opportunity to support this cause. Also, Dr. Nagi Zohir, Medical Advisor at Schlumberger, stated that "our health is our main asset". He added that early detection is the most important step to managing this disease, and the aim of this campaign is to spread awareness on how to detect and address problems with cancer early on.

During the event, a detailed presentation was introduced by Dr. Tamer Manie, consultant of Surgical Oncology at the As-Salam International Hospital and the National Cancer Institute in Cairo and a Fellow of the National Cancer Institute in Rome. He expressed his pleasure for joining this event for the third year. Dr. Manie expressed his desire to participate in these awareness campaigns in order to correct misunderstandings and misconceptions about the disease.

Dr. Manie explained the causes , risk factors and signs of breast cancer, the importance of early detection, genetic testing, new surgical options, and common myths related to breast cancer. He opened his discussion by explaining what breast cancer is, noting the difference between normal and cancer cells.

"Normal cells divide in a controlled and organized way, but stops at a certain point, whereas cancer cells start as a normal cell and some mutations happen leading to uncontrolled and unorganized and unstoppable division [forming] the tumor," Dr.Manie explained. He elaborated that "breast is made of two components; glandular tissue where cancer mainly exists and fatty tissues in addition to lymph nodes, which spread across the whole body and they can be a channel for passing the cancer cells, so it should be treated when the body infected by cancer."

Dr. Manie mentioned that "breast cancer contributed to about 33% of all female cancer" adding that the median age of diagnosis is 50 years old and the lifetime risk for women being diagnosed with breast cancer is currently one in every eight women. He disclosed that only 10% of breast cancer causes are genetic, while 90% of the causes are still unknown. "Genetic causes happen due to gene mutations including BRCA 1 and BRCA 2." These mutations give women high potentials to have breast cancer by 90% and at earlier age starting from the 40s in addition to possibly causing other types of cancer.

Dr. Manie also highlighted other risk factors that may cause breast cancer, including gender, age, and family history. With regards to gender, it is worthy of noting that 100 women are more likely to get breast cancer as opposed to one man. While elaborating on age, Dr. Manie explained that older women tend to be more vulnerable to the disease.

Moving onto family history, he emphasized that the risks increase when patients have a family history where breast cancer cases are more frequent. He also highlighted other risk factors, such as exposure to estrogen hormones (applies to women) for an extended period through early menarche and late menopause, getting pregnant after the age of 30, as well as taking hormone replacement therapy and oral contraceptive pills. He also emphasized that obesity and drinking alcohol could increase the chances of getting breast cancer.

However, Dr. Manie identified some factors that may decrease the risk of breast cancer, such as full-term/pre full-term pregnancy at a young age, breastfeeding, doing regular exercise, and following a healthy diet. He also discussed the signs of having breast cancer, which include an abnormal mass in the breast, skin dimpling orange peel, skin redness, nipple retraction, blood discharge from the nipple, and any change in the shape or the color of the nipple.

Dr. Manie insisted on the importance of early detection, noting that the cure rate of breast cancer is 98% at the first stage. He also elaborated that early detection will help avoid treatment that may be harmful, such as chemotherapy. Dr. Manie identified two steps for early detection, self-examination and imaging. He explained several positions which help in self-examination. Moreover, Dr. Manie emphasized the importance of genetic testing if there is a family member who has breast cancer.

Dr. Manie said that if genetic testing is positive, there are three options for treatment, including risk reduction surgeries, surveillance and hormonal treatments. He elaborated that there are certain guidelines that should be followed to decide the proper treatment for breast cancer. "The most famous is what we call NCCN guidelines. NCCN is an alliance of 31 cancer centers in the USA," Dr. Manie explained. He showcased various surgical options, including oncoplastic technique, skin-sparing mastectomy, and nipple-sparing mastectomy.

Dr. Manie tackled some myths related to breast cancer, such as biopsy will spread tumors, deodorants cause breast cancer, and removing the whole breast in order not to let the tumor come back. He elaborated that biopsies are important to accurately identify the type of tumor and its suitable treatment. Regarding deodorant, he said that there is no scientific proof that it causes breast cancer. The opportunity for the tumor to appear again is the same even when removing the whole breast.

At the end of the session, Dr. Manie advised the patients not to compare themselves with other cases, pointing to the fact that every case has its own diagnostic factors which affect the way of treatment. Finally the session was concluded with a Q&A session.

OFFSHORE EXPLORATORY DRILLING IN THE EGYPTIAN RED SEA

The Red Sea is an elongated depression filled with water and extends for about 2,000 kilometers (km) in a northwestern direction with a maximum width of 355 km. It occupies an area of approximately 458,620 square kilometers (km2). This huge basin is bounded by nine countries. The Red Sea basin emerged as a young oceanic zone that was developed by the seafloor spreading, due to the anticlockwise rotation of the Arabia peninsula away from Africa about a pole of rotation located in the central or south-central Mediterranean Sea.

The Egyptian sector of the Red Sea covers an area of about 70,000 km². It extends from Ras Mohamed in the North to the Egyptian-Sudanese border in the south. Natural hydrocarbon seepage seen in many areas surrounding the Red Sea region has attracted the attention of exploration companies for decades. There was clear evidence of a working hydrocarbon system, and the original exploration concept was to drill close to the oil seepage areas during the early pioneering days of the oil search.

Offshore exploratory drilling in the Egyptian Red Sea started in the northwestern region near the islands of Giftun and Shadwan. The main objective was to determine the possibility of finding the southern extension analogues of the proven petroleum system of the Gulf of Suez.

In 1974, the Egyptian Red Sea was divided into three concessions by the Egyptian General Petroleum Corporation (EGPC). The northern and central blocks cover an area of 12,000 km² each, and were operated by Esso and Phillips Petroleum respectively. The southern block covers an area of 10,000 km² and was operated by Union Oil.

Esso acquired 2D seismic data and drilled five dry wells (RSOT 95-1, RSOB 95-1, RSOZ 95-1, RSOB 96-1, and RSOX 94-1) between 1976 and 1981. These wells were drilled based on poor quality 2D seismic data and guided by the classical exploration concept of drilling structural highs. At the same time, Union Oil drilled two dry wells (RBOG 112-1 and RBOZ 108-1) in 1976. Then, Phillips drilled two wells (Quseir A-1X and Quseir B-1X) in 1977 and stopped their activities in 1981, after completing their exploration program in the block. By 1983, Total evaluated the acreage formerly held by Union Oil and drilled Mikawa-1 well in 1985.

The second exploration stage in the Egyptian Red Sea started in 1996. BG and IEOC operated two concessions covering areas of 13,000 and 15,000 km² respectively. BG acquired 3D seismic cube and ended the operation in 2000 without performing any drilling activities. IEOC drilled the Nagel-1 well in 2002 and ended their exploration activities in 2007. Finally, HESS drilled the Cherry-1 well in 2011.

The failure of Red Sea penetrations could be largely attributed to the difficulties in drilling valid structures due to the poor quality of seismic data, which suffered from serious contamination and limited sub-salt illumination. 12 wells in an offshore area of 70,000 km² were drilled using subsurface data which does not reflect the intricate subsurface geology of this vast area. Moreover, the inability to penetrate the pre-rifting sedimentary section added more uncertainty related to the occurrence of pre-rifting source rocks, and hence the area was abandoned and the exploration interest waned for several years.

I believe that the proven petroleum system of the Gulf of Suez should continue southward into the Red Sea, although the dominant petroleum product is likely to be gas. This can be realized by extensive drilling campaigns and the acquisition of high-quality 3D seismic data in future exploration programs.

AHMAD MOSTAFA

Exploration Department Head, South Valley Egyptian Petroleum Holding Company (GANOPE)

AMBITIOUS EXPANSION IN THE USE OF NATURAL GAS

In accordance with President Abdel Fattah El-Sisi's directives, the petroleum sector has been diligent in working to expand the use of natural gas, particularly when it comes to automobile fuel conversions and residential gas deliveries.

These efforts are to support the state's ambitions to spread social justice where it is needed the most, such as in remote governorates and regions. The petroleum sector has also been working to reduce the burden of obtaining butane cylinders for household consumption and relieve the state's general budget from the cost of importing butane. The use of natural gas as a substitute for butane has expanded during the past seven years. With all the work being done, the following has been accomplished:

- ☑ The total number of cars converted to work on dual fuels (gasoline and gas) reached 368,000, 42,000 of which were converted during the year 2019/2020.
- ☑ There is a plan to add 400,000 cars by converting 150,000 cars and replacing 250,000 cars within 3 years.
- ☑ An ambitious plan is being implemented to increase the number of fueling stations that offer natural gas to accommodate the targeted rise in demand.
- ☑ The number of homes to which natural gas has been connected is about 12.5 million housing units, 51% of which have been connected within 34 years since the start of activity 41 years ago and 49% of them during the past seven years.
- ☑ The rate of gas delivery to homes is 1.2 million housing units annually.
- ☑ It is intended to increase the total number of units delivered by gas from 12.5 million to 19 million housing units within the National Connection Project and the Haya Karima ('Decent Life') initiative.

Natural gas has been delivered to approximately 6.1 million housing units under the directives of the President. This figure represents 49% of the total number of units to which natural gas was delivered, ever since the gas delivery project began in 1981. Recently, gas deliveries have expanded to about 12.4 million housing units, something that has been witnessed for the first time. For the first time, the natural gas sector is also witnessing delivery rates that exceed one million housing units per year.

The number of butane cylinders that have been replaced by natural gas during the past seven years is estimated at about 110 million cylinders. This led to a reduction in butane subsidies, which saved more than EGP 8 billion. These funds were then directed to support butane cylinders importing during this period.

The initiative to install the cost of gas delivery to homes

In 2018, Minister of Petroleum and Mineral Resources Tarek El-Molla introduced an initiative to provide affordable installments for the cost of delivering natural gas to housing units in cities and villages of average citizens.

Families in social housing projects have been receiving natural gas for the first time only with a monthly premium of EGP 30 that is added to the consumption bill for 6 years without interest. This part of the government's promise to reduce the burden of delivery and fueling costs on citizens. It will enable large segments of Egyptian society to benefit from natural gas being delivered to their homes as a service.

Currently, natural gas is being provided to more than 198 new areas, where it previously was not available. By implementing the state's policy to use prepaid meters in all state utilities, the process of collecting payments for gas bills has become more efficient There are 266,000 prepaid meters that have already been installed.

Egypt is moving forward in all fields in order regain its important position on the world stage.

MOHAMED ABDELRAOUF "

Production Ass Gen Mge Qarun petroleum co"

تحت رعاية صاحب السمو الشيخ خليفة بن زايد آل نهيان رئيس دولة الإمارات العربية المتحدة

UNDER THE PATRONAGE OF H.H. SHEIKH KHALIFA BIN ZAYED AL NAHYAN, PRESIDENT OF THE UNITED ARAB EMIRATES

أديبك ADIPEC

Host

أدنوك ADNOC

15-18 November 2021

Abu Dhabi, United Arab Emirates

Supported By

وزارة الطاقة والبنية التحتية MINISTRY OF ENERGY & INFRASTRUCTURE

مركز النقل المتكامل INTEGRATED TRANSPORT CENTRE

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دائرة الثقافة والسياحة DEPARTMENT OF CULTURE AND TOURISM

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UNLOCKING NEW VALUE OPPORTUNITIES **IN THE ENERGY SYSTEM**

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- **New market dynamics in a changing energy world**
- **Fueling the future: the new energy agenda**
- **Building the energy company of the future: new business models and investment flows**
- **Transformational technologies: unlocking the engines of change**
- **Dedicated hydrogen sessions throughout the four day conference**

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- Strategic Conference
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- Downstream Technical Conference
- Smart Manufacturing Conference NEW
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EGYPT OIL&GAS RESEARCH & ANALYSIS

Value and Volume of Shares Traded for Energy & Support Services Sector in Sep 2021

VALUE TRADED (EGP BILLION)

% OF TOTAL VALUE TRADED **1**

VOLUME TRADED (BILLION SHARES)

% OF TOTAL VOLUME TRADED **0.93**

Performance of Petroleum Companies in the Egyptian Exchange in Sep 2021

NATIONAL DRILLING

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
USD	4.69	-

ALEXANDRIA MINERAL OILS CO.

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	3.8	▲ 21.79

EGYPT GAS

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	47.45	▲ 8.91

SIDI KERIR PETROCHEMICALS

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	8.89	▼ 4.51

MAIN ECONOMIC INDICATORS

August 2021 | September 2021

ANNUAL INFLATION HEADLINE CPI (%)

5.7 ▲ 6.6

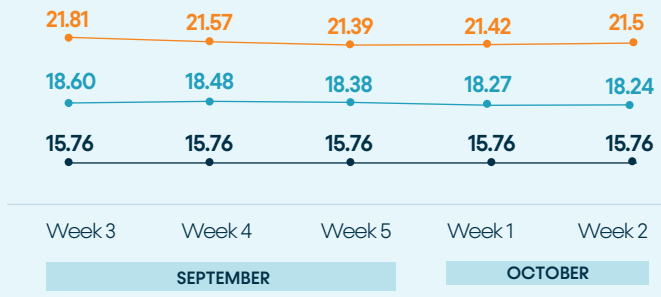
NET INTERNATIONAL RESERVES ($ BILLION)

40.67 ▲ 40.83

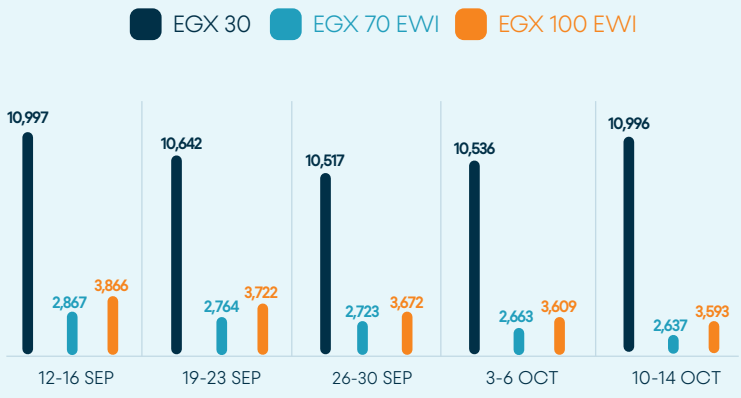
NON-OIL PRIVATE SECTOR PMI (POINTS)

49.8 ▼ 48.9

EXCHANGE RATES



CAPITAL MARKET INDICATORS



Source of Raw Data: CBE, CAPMAS, Egyptian Exchange, IHS Markit

DEVELOPMENT OF NATURAL GAS WELLS OVER FY 2020/21

Brought On Stream **15**

Average Production **> 6.8** bcf

■ Daily Production

Natural Gas
1.4 bcf

Condensates
> 25,000 bbl

STARTING AL HAMAD ONSHORE STATION PROJECT

Company: GPC

Cost: EGP **1** billion

Aim: Converting the station into treatment plant

NEW SEISMIC SURVEY PROJECT IN THE CENTRAL GULF OF SUEZ

Companies
GUPCO
Western Geco

Cost
$**49** million

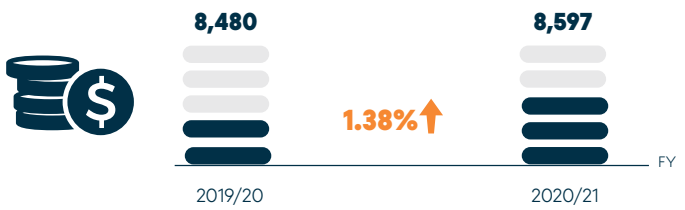
Target
7
development wells

Technical Studies
6 wells

DEVELOPMENT OF NATURAL GAS INFRASTRUCTURE IN SINAI & SUEZ CANAL ZONE OVER 7 YEARS

July	■ Natural Gas Lines (km)	■ Natural Gas Facilities
2014	1,015	1,056
2021	2,928	1,931

PETROLEUM SECTOR EXPORTS ($ MILLION)



AL ALAMEIN COMPLEX TO MAXIMIZE NATURAL GAS VALUE

Area
1,600
feddans

Estimated Investments
$**10.5** billion

Petrochemicals Production
6
mmt/y

INTERNATIONAL OIL PRICES

	BRENT PRICES ($/BBL)	OPEC BASKET PRICES ($/BBL)	NATURAL GAS PRICES ($/MMBTU)
04 August	70.38	71.83	4.16
20 August	65.18	66.13	3.85
10 September	72.92	71.98	4.94
30 September	78.52	77.72	5.87
06 October	81.08	80.63	5.68
15 October	84.86	83.54	5.41

Baker Hughes Remote Operations Services: At a glance

2019

Executed HALF of the company's total drilling jobs

Drilled or logged **3,350** onshore wells in North America alone

Drilled 42 MIL feet globally

2020

Executes 55% of the company's total drilling jobs

Delivers services in **30+** countries

Deploys from **20+** centers and customer offices

TODAY

Baker Hughes can support

100%

of our Directional Drilling and MWD/LWD portfolio using Remote Operations Services

Remote drilling and evaluation

BY THE NUMBERS:

360+
engineers and geologists supporting operations worldwide

100%
connectivity with every Baker Hughes drilling operation

300+
shifts-per-day delivered remotely

bakerhughes.com

Baker Hughes