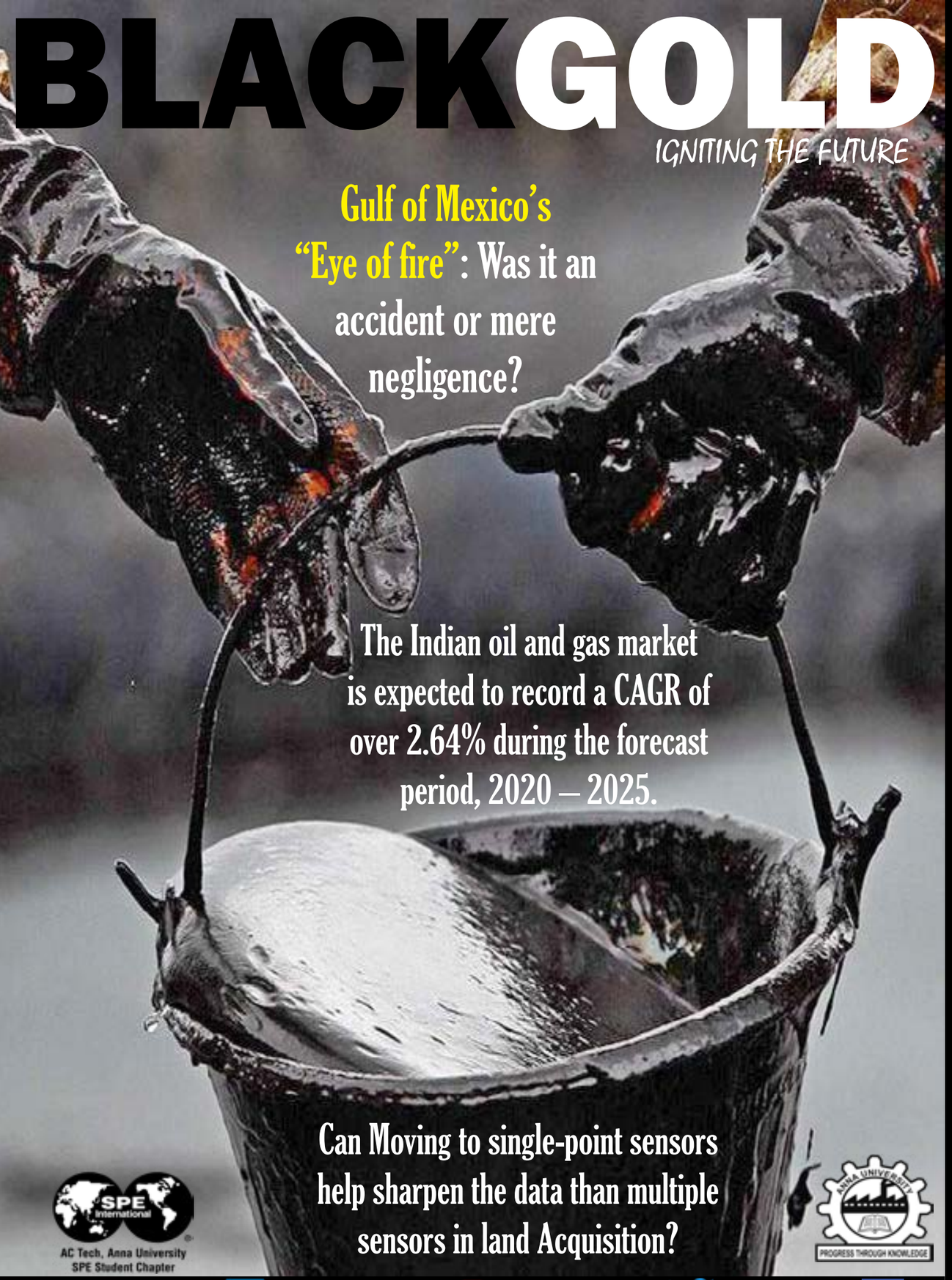

MESSAGE FROM THE EDITORIAL TEAM

"Write to be understood,speak to be heard,Read to Grow"

Warm greetings to our readers, We proudly present to you the 1st edition of **Black Gold-Igniting the future**- the official magazine of SPEAUACT Student Chapter. It presents authoritative briefs and features on technology advancements in exploration and production, oil and gas industry issues, and news about SPE. BLACK GOLD Magazine is the homepage for budding Petroleum Engineers featuring a mixture of information, including the latest news, views, project updates and trends, the digital and answers the needs of the global oil and gas industry. Each edition includes informative feature articles, interviews with industry leaders, energy scene highlights, guest articles, new technology, and columns from students. We provide a unique insight into key industry sectors covering local and international energy markets delivering the latest Oil and Gas news; analysis of issues and events; and important statistics on international markets and activity.

We are thankful to **Dr.S.Kalaiselvam(HOD,DAST)** and **Dr.J.Jayapriya(Faculty Advisor,SPEAUACT)** for their endless support and constant motivation. We are also thankful to you as **"A writer only begins a book, a reader finishes it."**

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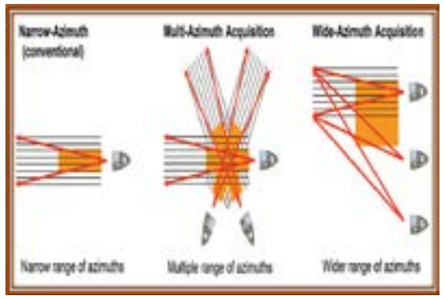

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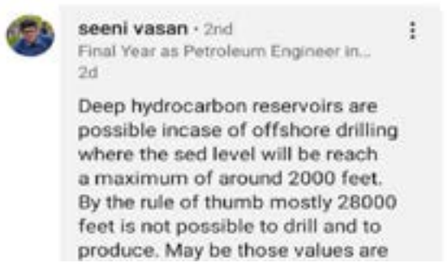
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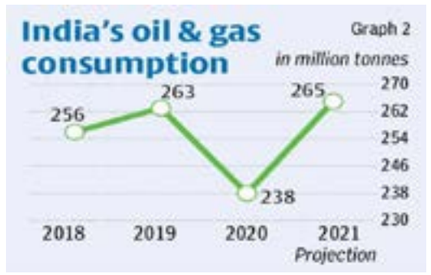

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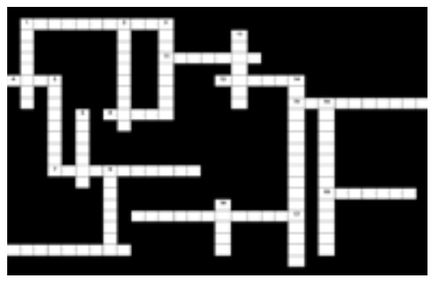

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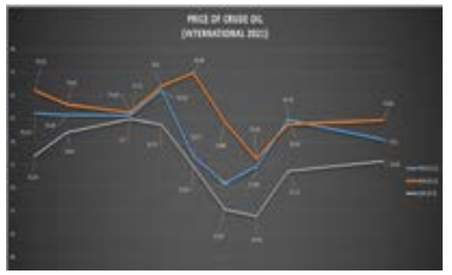

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AC Tech, Anna University SPE Student Chapter

About Us

AC Tech, Anna University SPE Student Chapter (#6098 - Chennai Section) is one of the registered Student Chapters of Society of Petroleum Engineers (SPE) International which provides the operating framework for Society activities at university level. The student chapter is organised under the **Department of Applied Science and Technology (DAST), Alagappa College of Technology, Anna University.** The department offers Full-Time Courses in B. Tech. Petroleum Engineering and Technology and M. Tech. Industrial Safety and Hazard Management. The department is progressing exponentially with a vision for developing efficient and technically sound students to outperform their contemporaries in their career in oil and gas sector worldwide and the department has always lent a supporting hand to the pupils for their enrichment in technical knowledge and exposure to industrial experience.

Mission and Vision

AC Tech, Anna University SPE Student Chapter aspires to open doors to each affiliate, for individual and professional advancements through an amalgamation of events round the year including the Series of Distinguished Lectures by the Stalwarts of Oil and Gas Sector, Workshops, Soft Skill Development Seminars and a plethora of contests. We will

endeavour to provide pupils a typical stage to grandstand their insight before famous industry veterans and contend with peers. The learning projects will enhance the technical and professional competences of student members by collecting, disseminating, and exchanging technical knowledge concerning the exploration, development and production of oil and gas resources and related technologies for the public benefit and thereby making student members familiar with Reservoir, Drilling and Production Engineering and furthermore get acquainted with Health, Safety and Environmental elements of Oil and Gas industry. We are envisioned to bridge the gap between Industry and Academia for a general proficient development of both students' community and the industry. We buckle down towards reaching the sky, and our tenacious, ardent and persistent undertakings will empower us accomplish the **"OUTSTANDING STUDENT CHAPTER AWARD"** sooner rather than later. We look forward to your support and par-

ticipation in the entirety of our endeavours.

Achievements

We are immensely honoured for that the **Petroleum Engineering course in Anna University is featured in the top 51-100 bracket in the global QS World University Rankings 2021 and our Anna University has secured Rank 388 in World's Top 400 Institutes besides all IITs in India.**

Anna University is the only state university that has been ranked very high in **Petroleum Engineering this year.** It shows that the talent is not only confined to IITs, but also comes from other state universities as such. We did well in indicators like research output including H-index citations (72.7) and citations per paper (78.1), the scores in other indicators like academic reputation (53.9).

Petrovision

Petrovision is a **National Level Technical Symposium** conducted by AC Tech, Anna University SPE Student Chapter, Department of Applied Science and Technology, Anna University and it will be held over a period of two days annually. Petrovision kindles the flame in young minds through Workshops, Technical Events and Distinguished Lectures for the students to embark on their journey towards industrial glory. It provides opportunities to the students to collaborate with students of different regions and communities of same sector.

The objective of organizing this symposium is to provide a forum for interaction among the researchers, technologists, academicians and students to exchange their ideas and identify the manpower skills required for the industry. The deliberations will also provide opportunities for establishing collaborations, identifying avenues for translating research progress to useful products and other application prospects. The fest serves as an arena to encourage a sense of productivity.

Chapter Activities

SPE AUACT Student Chapter is immensely gratified to formulate **"Petr-O-ration"**, a Series of Seminars which is aimed to bridge the gap between academia and industry and to provide each affiliate with the opportunities for professional development through the series of Distinguished Lectures by the Stalwarts of Oil and Gas Sector. It also provides an interactive forum to identify the essential manpower skills required for the indus-

try. The seminars also occur through any of Online Platforms in view of various circumstances. Several Pupils, Research scholars, Faculties from various Universities across the world attend it regularly and have got benefitted.

SPE AUACT Student Chapter is extremely ecstatic to present **"Petr-O-Probe"**, an exhilarative International Level Online Quiz Competition periodically. The chapter provides an enchanting opportunity to the pupils of oil and gas sectors across the world to enhance the technical exposure and for a good learning experience. This brainstorming quiz session was previously hosted in collaboration with **My Swots and Tutee HUT**. The Quiz is bifurcated and conducted under two Domains such as "Petroleum" and "Petrochemical" domains, enabling the participants to choose one of or both the Domains while registration. The enthralling event perceived

enormous participations from various National and International Universities.

Journal

BLACK GOLD

BLACK GOLD – Igniting the Future, SPE AUACT Student Chapter' flagship magazine, presents authoritative briefs and features on technology advancements in exploration and production, oil and gas industry issues, and news about SPE. **BLACK GOLD** Magazine is the homepage for budding Petroleum Engineers featuring a mixture of information, including the latest news, views, project updates and trends, the digital and answers the needs of the global oil and gas industry. Each edition includes informative feature articles, interviews with industry leaders, energy scene highlights, guest articles, new technology, and columns from students. We provide a unique insight into key industry sectors covering local and international energy markets delivering the latest Oil and Gas news; analysis of issues and events; and important statistics on international markets and activity.

Social Initiatives

SPE AUACT Student Chapter is socially concerned by inculcating the goodness of benevolence in us under the scheme of **"SPE Cares"** by organising numerous Fundraising Events to provide some financial assistance as a timely help to several Voluntary Organisations, Non-Governmental Organisations, Children's Trust, Old Age Homes to cater the basic needs of humanity to the people from different walks of life. We put a smile on the faces by donating something that would facilitate them in this mean time.

MURAL – A Wall Art Painting Event

SPE AUACT Student Chapter is socially concerned to organise various beneficiary activities to the society and environment under its scheme of SPE Cares. It finds the great opportunity to organise the Wall Art Painting in schools, colleges and other public buildings with various social themes, thereby improving the infrastructure of the buildings and imparting the social values to the people.

We organised the first edition of this event from March 24 to Mar 28, 2021 in **Arignar Anna Govt. Higher Secondary School, Besant Nagar, Chennai.** The inauguration of the Wall Art Painting Event Mural took place on March 29, 2021 in that school with several NGOs like Uravugal Trust, Karpi Organisation, Karunai Ullangal, Extended Family and Thozhan and several other dignitaries as guests.

Passion Pavers

SPE AUACT Student Chapter takes immense pleasure to organise various motivational and career guidance programmes under its initiative **"Passion Pavers"** to the student community from schools/universities. In today's competitive world, it has really become difficult to select the right kind of career which not only suits the student's skill sets but also allows them to excel in their profile. The situation gets worse with the lack of opportunities and right direction. In all such circumstances the role of career guidance plays an important role. Our sessions help students to select the right kind of job oriented courses which will help them to take their career in the right direction. The career guidance is provided by the occupation or education in future which goes well with their capabilities, skills and interest.

Here we share the glimpses of our first Passion Pavers Programme by Mr. Irshad in Aringnar Anna Govt. Higher Secondary School, Besant Nagar, Chennai.

Unavu

SPE AUACT Student Chapter is immensely honoured for having our collaboration with **"unavu"** a registered Non-Governmental organisation that is aimed to cater one of the basic needs of humanity, food to the needy. The Chapter is morally concerned by instilling the kindness and altruism in us under the scheme of "SPE Cares". Unavu has initiated **"Unlock the Hunger Sundays"** scheme that endeavours to distribute food packets to the needy during Total Lockdown Sundays where and when the restaurants are even closed in Tamil Nadu. Our Student Chapter raised funds to contribute them last Sunday.

"If we can't feed hundred people, we can just feed One"

Unavu has brought out that opportunity of donating a Meal at ₹20. Our Student Chapter insists each and every one to be a part of this noble cause.

We deeply appreciate and acknowledge the efforts of unavu_foodforall to the Society.

SPE Green Campaign

SPE AUACT Student Chapter feels glad to have launched the **"Foster A Tree"** initiative under the banner of "SPE Green Campaign" thereby contributing to the sustenance of Earth's biosphere. The Student Chapter Members are encouraged to plant saplings in the places they reside and are advised to adopt those unto its lifespan. As deforestation has ramped up, Earth's climate has changed significantly and a global reforestation effort can have a gradual climate mitigation impact. What happens to Earth 100 years from Now depends on the choices we make today!

Publications

Tech Tuesday

(Since June 08, 2021)

SPE AUACT Student Chapter is extremely elated in bringing out the latest technological and updates from all oil and gas sector. Tech Tuesday brings the latest developments in this sector. It not only extensively covers the sector but also curates and gets you the most relevant technological news in the oil and gas industries.

Thoughtful Thursday

(Since June 10, 2021)

Understanding technical terms and knowing fundamentals is very important in oil and gas industry. Thoughtful Thursday aims to bringing out concept in simpler way. This publication contains various technical terms collected source from various oil and gas industry.

Subsurface Sunday (Since June 07, 2020)

SPE AUACT Student Chapter is immensely privileged for having introduced the periodical literature, "Subsurface Sunday" on the most fascinating facts of Reservoir Engineering which is of a great importance to the technical and economic evaluation of the oil and gas reserves and the selection of the optimum method of recovery.

Neoteric News (March 26, 2020 – March 20, 2021)

SPE AUACT Student Chapter is extremely elated in bringing out the latest energy news, views and updates from all top sources of international energy industries through our literary publication, "Neoteric News" frequently. To ensure that industry leaders keep pace with this fast changing exciting industry, Neoteric News brings the latest developments in this sector. It is not only extensively covers the sector but also curates and gets you the most relevant news and analysis in the oil and gas industries.

Fossiliferous Friday (March 27, 2020 – March 19, 2021)

No matter how advanced our economy might be, no matter how sophisticated our equipment becomes, for the foreseeable future we will still depend on fossil fuel. As it's well stated, SPE AUACT Student Chapter finds a great chance of eliciting the fascinating intricacies of fossils and geological facts through a periodical literature called "Fossiliferous Friday".

Safety Sunday (March 29, 2020 - May 31, 2020)

Safety is important to everyone and is a core value for the natural gas and oil industry. Personal safety and process safety work hand-in-hand to ensure responsible

development of natural gas and oil by providing the essential products that make modern life possible while keeping our workers and nearby communities safe. SPE AUACT Student Chapter is exceedingly concerned and it throws light on safety procedures to be followed by analysing various disasters of natural gas industries through a periodical literature "Safety Sunday". This periodical edition was ceased on 31st May, 2020 and it paved way for the other Weekly, "Subsurface Sunday"

Machinery Monday (March 30, 2020 – March 22, 2021)

One machine can do the work of fifty ordinary men. No machine can do the work of one extraordinary man. SPE AUACT Student Chapter insists on being an extraordinary man by mastering the extraordinary machines. Hence the student chapter finds the great opportunity to share the information on machineries that rule the drilling, production, reservoir and refining industries through the periodical literature "Machinery Monday".

This periodical is exceptionally useful to develop a feel for hydrocarbon behaviour in the reservoir and of various recovery methods. It provides the specific applications of the process used in reservoir engineering and enhances the skills in solving reservoir engineering problems and maximizing recoverable reserves.

ADVANCEMENT IN SEISMIC EXPLORATION

-ANKUR ADARSH (IIT ISM, DHANBAD)

Scientists often explore for oil and gas reserves by transmitting waves of energy through the earth's crust, and recording how they're reflected back. Called seismic exploration, this process often involves using vibrating trucks, underwater air guns or explosive. The returning energy is usually detected by acoustical instruments, then analyzed with powerful computers. Different layers within the ground can reflect the energy differently, so scientists often use seismic exploration to seek out areas which may have oil, gas, or valuable minerals.

Seismology is usually supported the composition of rock layers, within the earth's crust, that affects how energy interacts with underground materials. Energy waves usually move through the rock then reflect back toward where they came from. The direction within which they return can give an inspiration of what properties the rocks have. Data on the returning seismic waves are typically analysed by supercomputers and 3D imaging software. Engineers can use this information to locate the simplest sites to begin drilling.

- On land, dynamite and other explosives are sometimes drilled into the ground at various places and detonated. The explosions typically generate seismic waves, smaller but similar to those in an earthquake, which hit rocks below the surface and bounce off of them. Devices called geophones can be placed throughout an area to detect the returning energy. Vibrating trucks are sometimes used during seismic exploration, which lift up on a pole and shake the ground. These generally do not cause as many disruptions as explosives and are more often used in populated areas.
- With underwater seismic exploration, compressed air bubbles can be ejected, which hit the rocks at the bottom.

Energy is reflected by rock layers below the ocean floor and is often picked up by instruments called hydrophones. These are usually attached to ships. In choosing a drilling site based on the data received, engineers can determine if fluids, faults, or other formations underground can interfere with the project.

Seismic exploration is generally more useful in finding evidence of gas. It often helps in determining the shape and size of an underground reservoir, while measurements of electrical resistance are usually better for oil exploration. Seismic methods can be used for both, and can help engineers decide the best way to get to the reserve. This technique is often part of geophysical testing to find hydrocarbons. In many places, it is regulated by local and regional agencies where the environment is of concern, such near the artic icecaps and many offshore locations.

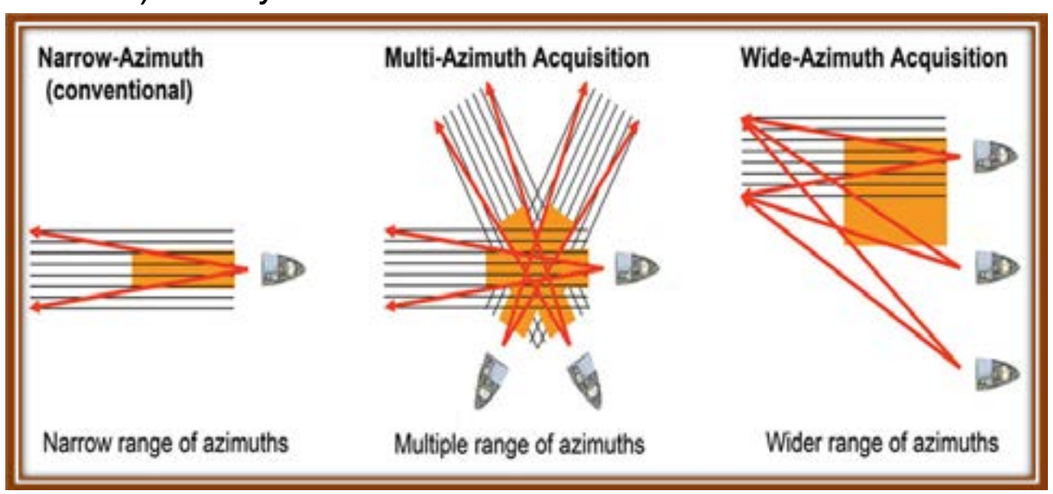
We have addressed a set of key challenges below for many oil and gas field scenarios, and discuss how various advances in seismic technology are applicable solutions, in-

Technology advances to improve target illumination in geology with complex overburden.

- Seismic wave propagation through the world becomes sophisticated once speedy lateral variations within the earth science (velocity) model exist higher than or close to the target. within the worst state of affairs "multi-pathing" happens and a number of other seismal arrivals from identical interface are recorded at coincident surface locations. this can translate to degraded image quality, resolution and interpretability. Furthermore, several areas on the target interface may correspond to holes in seismic illumination, and solely weak or scattered seismic energy conjointly be is also

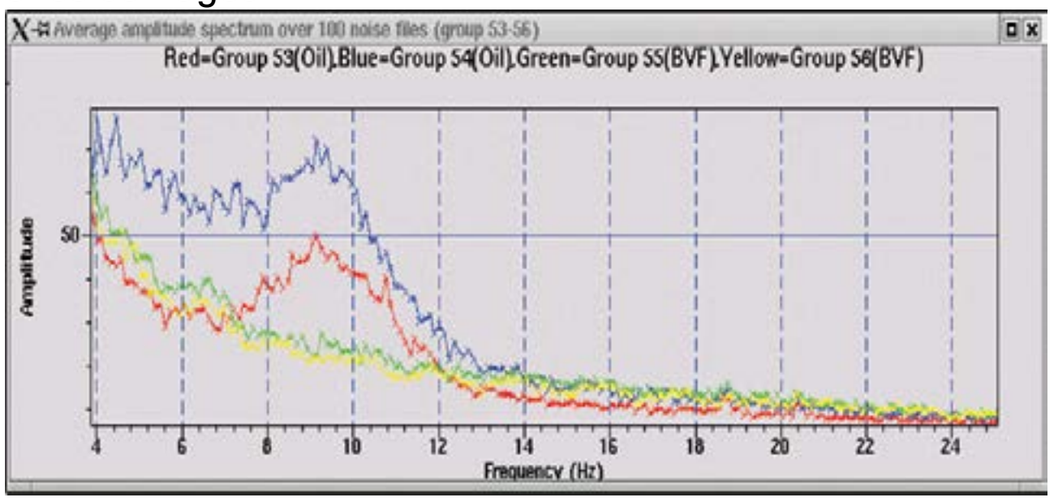
mirrored back to the surface. this can also correspond to poor or useless seismic images. Poor illumination is most typical in the single vessel streamer state of affairs as a result of a slim vary of supply and receiver distributions could be a logistic outcome for any given shot.

• Fortunately, trendy modeling technology will demonstrate the quantitative relationships between acquisition geometry, the earth science model, and also the effects upon image quality. a brand new method conferred in Laurain et al (2004) simulates the potential image quality at elite horizons in a very 3D geological model for a given survey configuration when migration. the tactic is predicated upon 3D ray tracing and incorporates anelastic attenuation and the realistic frequency information measure of the seismal signal. In contrast, previous illumination analysis tools did not incorporate the physicist zone, and didn't incorporate scattering effects once estimating image quality. Such tools can complement the expansion of Multi-Azimuth (a survey nonheritable in 2 or additional directions by one vessel) and Wide-Azimuth (a survey acquired with two or more supply vessels, so as to considerably increase the crossline aperture for every shot location) surveys.



Technological solutions for noise reduction in acquisition and processing

• Swell noise is downsideatic in marginal atmospheric condition as a result of “bulge waves” propagated on the surface of fluid-packed streamers produce unwanted low frequency noise bursts. One commit to overcome this problem has been enforced by WesternGeco, who apply compounding and dip filtering routines in process to closely-spaced single hydrophone recordings. The parameterization of the filtering weights are primarily based upon conditions of overall survey, and should so vary throughout the survey area. Another approach to the present problem is to introduce solid streamers. Solid streamers became progressively well-liked thanks to the improved performance in marginal weather and therefore the absence of potential fluid discharge into the setting once damaged.



• Another varient of problematic unstable noise arises from production- connected close to the seismic survey location. Examples embody vessel interference, mounted installations Associate in Nursing drilling. “True 3D” process solutions

developed recently take away such noise in a chic manner by modeling, aligning, then removing every 3D noise supply in an repetitious manner from all traces in each gather

- Note that as most multiple and noise types are generated within near-surface, their apparent dip on seismic crowds will be large, and such events will be prone to aliasing. Dense 3D spatial sampling will be critical to the success of any effort in processing to attenuate noise and multiples whilst simultaneously preserving the high frequency content of the underlying primaries – even when the primary targets are very deep. This fact is often overlooked. Fortunately, modern vessel technology permits the efficient allowance of high-density streamer spreads with very high streamer counts.

Better resolution

- High resolution of unstable knowledge results when high frequency geologic options in shut proximity are often exactly centered with none contamination from artifacts or noise (i.e. high signal/noise ratio). In general, recoverable frequency information measure is a vital issue for vertical resolution Associate in Nursingd dense 3D spacial sampling is an important factor for spatial resolution. Vertical and horizontal resolution are connected by the process of high frequency focusing and imaging.
- High resolution of 3D seismic data is achieved by the application of rigorous geophysical principles. In particular, the systematic pursuit of: 1. Uniform target illumination, 2. Dense spatial sampling of the reflected wavefield, and 3. Careful processing and imaging, will collectively deliver an optimum esult (Ramsden et al., 2005). Note that the final step can never be successfully completed without the platform of

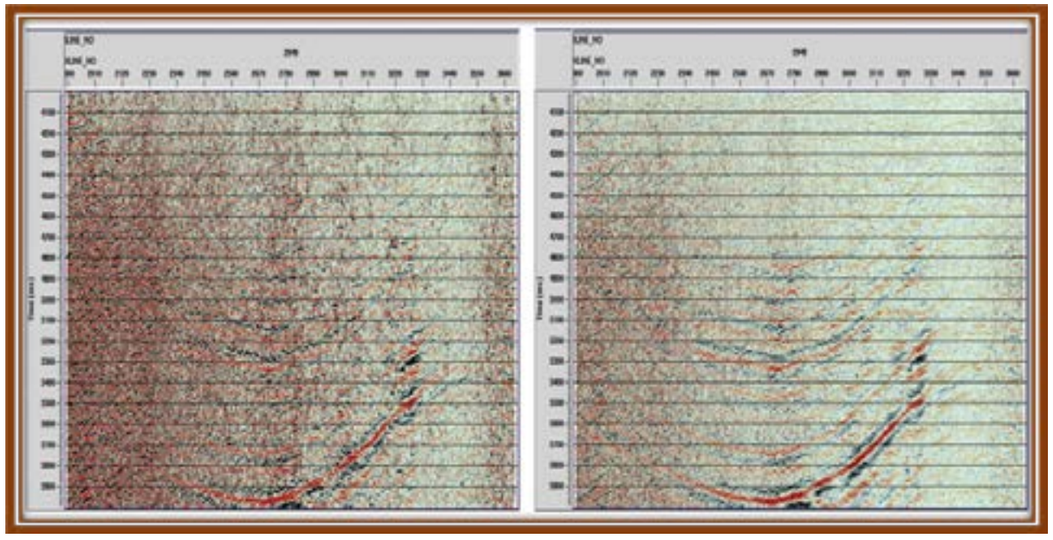
proper target illumination and wavefield sampling. The use of Multi-Azimuth and Wide-Azimuth acquisition to improve target illumination was discussed earlier.

Seismic improvements for reservoirs masked by complex multiples

- Seismic multiples can have a multiple of mechanisms, and are a tremendous problem in many areas. Surface Related Multiple Elimination (SRME) has emerged in recent years as the first realistic method to handle mechanism in 3D geology. The technique itself is very depictive as it predicts all the mechanisms reflected from the free surface from the data itself. The surface-related mechanisms are computed by concluding all possible common shot gathers with all receiver gathers respectively. The 3D implementation of SRME assumes that sources and receivers are there in all possible surface bin locations. This is impossible in practice. Hence, the challenge to 3D SRME lies in the interpolation or inversion of missing data (e.g., van Borselen et al., 2005). 3D SRME has been applied to most streamer geometries, primarily due to significant improvements in “data regularization” technology, but it is proven that denser sail line spacing combined with denser streamer configurations yield optimal results.

- 3D SRME is usually touted as a potential solution to “multiple diffractions”; the most challenging multiple scenario, where the apex of diffractions associated with surface or near-surface heterogeneities is out-of-the-plane, and multiples of such diffractions obscure the target geology. As an alternative acquisition-based solution, a customized variant of Wide-Azimuth has been proven to suppress multiple diffractions. The configuration used was a dual-source eight-

-streamer vessel and an additional source vessel. Nine different sail line passes were made over the same location, each pass with a different lateral separation between the two vessels, and the data were binned into eight different azimuths. Figure 4 shows a comparison of a single azimuth and all azimuths combined. The figure clearly illustrates the enhancements in image quality obtained by using stacking to exploit the differential moveout of diffraction multiple events after the primary events are flattened.



Seabed Acquisition

• Wood said that amazing results have been achieved in shallow waters, and new recording techniques have been introduced to the seafloor. These devices are used at a depth of 50,500 meters to avoid noise and reflection problems that are common near the surface. Some hydrophones record as low as 2 Hz or lower, while digital accelerometers can record as low as 0 Hz. **"These devices collect data at very low frequencies and very long ranges,"** he said.

• The deeper the deployment, the more complex and expensive the hardware. Wood said that it is difficult to exceed 500 meters in depth. "At this depth, the cables are heavy. They may also be covered by gravel, which requires a very heavy transportation system," he explained. He said that for the few cases where seafloor data needs to be obtained in very deep water, seafloor nodules can be selected. For example, Wood says, if there is a cloud of gas or dissolved gas near the surface, the gas will absorb the energy of the image. However, seabed acquisition surveys can successfully draw geological maps.

• Sensors are also installed in permanent arrays. **"One of Ekofisk's systems has been in operation for many years and is working well,"** Wood said. He said that the array consists of 4,000 receivers and is purely optical. The passive array is designed to be used in the field for a lifetime, so Wood says it can be queried at any time and used in controlled studies at least once a year. Permanent sensors can easily track changes in storage tanks over time.

Land Acquisition

• Onshore, several changes are coming for sensors, Wood says. As the density of acquisition points increases, the use of multiple sensors is decreasing. Multiple sensors have been used to deal with noise generated by ground roll or surface waves, he says. The downside to this deployment strategy is smearing of data because the data come from more than one point. “Moving to single-point sensors can help sharpen the data,” Wood states. “Higher channel count addresses the noise issue.”

• Wi-Fi-capable nodes are proving to be important land-based assets in regions where it may be too risky to wait

on collecting data. “Nodes and batteries get stolen,” Wood points out, saying Wi-Fi nodes transmit their data to passing helicopters or trucks, ensuring data safety. If a node is stolen, it can be located through global positioning satellites. “The contractor can find the unit easily and retrieve the data without alerting or confronting the thief,” Wood says. “Data cannot be held hostage.”

Magnetics and Shale Plays

• Shale geology was initially regarded as a very simple platform with little change and structure. **"We now understand that there are some lithological structures and variants in shale,"** Prieto Said. He pointed out that some lithologies shows magnetic susceptibility. High-resolution aeromagnetic surveys and trends in magnetic shale will provide a lot of detailed information about shale. Slate quarries and infrastructure.

• “This has been an awakening,” Prieto enthuses. “We know of one high magnetic susceptibility prone mineral in the Marcellus subgroup. When we have that level of magnetic susceptibility in the lithology, we are assured of obtaining considerably more structural detail.” For this reason, she reports, a three-state, high-resolution aeromagnetic survey is under way in the Appalachians, covering the Marcellus trend. A joint venture between Integrated Geophysics Corp and CGG, she says the survey will provide close-spaced data coverage. The IGC interpretation will include the basement and shale structure faults.

• Prieto says the first of three packages should be delivered this year. Clients will be able to integrate their seismic to determine where they need to acquire a bit more or place a well. “There are small surveys in the area now,” Prieto

comments. “This aeromagnetic survey will be uniform, state of the art coverage over the entire trend. It should be very impressive and extremely useful in determining the optimum placement of additional exploration dollars.” Where there is no magnetic susceptibility in the shale lithology, magnetics still can provide information on the basement structure and secondary faults to avoid. Prieto says the seismic is left to determine the extent of shale fracturing.

Risk Management

• In the next 510 years, risk analysis will become the focus of the global geological workflow, predicts Garrett Leahy, technical product manager for Roxar software solutions in Emerson's business unit. Process control. He insisted that including all data in the risk analysis workflow is essential for interpretation, and Leahy said that risk analysis is based on the translator's assessment of uncertainty. The more evaluations performed, the more reliable will be the risk management. He said that the uncertainty estimates contained in all data constitute the basis for several realizations of the structural model, and generate risk distributions based on the quantity, economic factors, and the probability of specific error detection, as well as the uncertainty from the beginning, until the final structural model and The workflow of risk assessment," he said. **“This adds a new dimension to how implementers perceive uncertainty and manage risks”**, Leahy said. He explained that it starts with seismic data interpreted across horizons and faults. The data are all due to the uncertainty of the modeling process and multiple realizations of the structural model, and each realization is disturbed in the uncertainty area. The horizon and faults can move inside the envelope. Leahy said that the reservoir volume can be calculated for each run, and the volume histogram gives a probability distribution.

VOICE YOUR VIEWS

Petroleum which is known as fossil fuel are formed over millions of years under high pressure and high temperature from the remains of organisms that lived during that time. It is evident that fossils hasn't been found below 16,000 ft and we still drill to the depths of 28,000 to 30,000 ft to exploit the resources available. What do you think is the reason for this contradicting fact? Is Petroleum found at those extreme depths? If yes,how is it generated?

Pearlina Marie Rein K · 2nd
Assistant head of Petroleum engineering d...
26m

Origin of petroleum is till date a dilemma inspite the wide range of researches conducted. We do have theories but still they are theories and not accepted by everyone having their own contradictory points .I think it may be because of the outgassing deep earth's mantle via tectonic activities or the hydrocarbon present there may be the by product of some other reactions like the metamorphic transformation of the dark green olivine mineral which was found in earth's mantle. Most of the hydrocarbon producing regions are located close to the belts of tectonic activities . And owing to the fact that it comes from the mantle it's no surprise that they are found in such depths. This theory is known as the serpentinization theory and is still a theory .

Baggio D' Souza Ensilome · 2nd
Petroleum Engineering Graduate actively s...
1w

Reasons for Greater Drilling Depths;
1. Possibility of migration of crude to greater depths due to gravity, pre-diagenesis.
2. not the source rock but the reservoir rock matters for exploiting the pay zone.
3. Crude at greater depths are rather highly matured and hence sweet and less processing- economic benefit
4. Possibility that fossils below 16 k ft do not necessarily remain fossils, they wither and disintegrate due to greater temp and pressure.
5. Oil drilling has got a norm to itself that it has to be deeper drilling.... no evidence though, just opinion of the majority, lol..

Ravufur Rahman · 2nd
Student at Anna University Chennai
1w

May be the organisms that lived during the period when the sedimentary layers at those depths were formed were just tiny and were unable to get fossilised, but still managed to be enough raw material for generation of petroleum

D. Keerthi Narayanan · 2nd
Student at Anna University
1w

I think that 28,000 ft refers to the total length the well is drilled and not the true vertical depth. But there are also chances that the petroleum generated may travel to such depths by the forces of gravity

lallith kumar · 3rd+
Student at Anna University
9h

A possible explanation could be the Metal Carbide theory, where metal carbides deep in the earth reacted with water at high pressure and temperature to form acetylene which then condenses to heavier hydrocarbons. as this formation was already deep and the condensation would have made it go even deeper

seeni vasan · 2nd
Final Year as Petroleum Engineer in AUACT
2d

The most petroleum reservoirs are found under sea beds and river beds. Since the formation of oil is obtained from the dead phytoplankton and zooplankton which were dead and sedimented over a period of millions of years. During the sedimentation process those organisms were converted into kerogen (organic compound which is insoluble in other organic solvents) with bitumen as a byproduct. Later the maturation process takes place based on the temperature and pressure. As the temperature gradient increase the kerogen will convert into oil (maturation)and then further increase may convert into gases and further increase covert those gases into useless graphite(matagenesis) with is not an interest to petroleum engineering .The oil and gas window also depend on the type of organisms sedimented. At greater depth most of reservoir rocks i.e., sedimentary rocks will be converted into metamorphic rock were we can't extract the oil since their porosity and permeability were not ideal for production.

seeni vasan · 2nd
Final Year as Petroleum Engineer in...
2d

Deep hydrocarbon reservoirs are possible incase of offshore drilling where the sed level will be reach a maximum of around 2000 feet. By the rule of thumb mostly 28000 feet is not possible to drill and to produce. May be those values are Measured depth of directional or horizontal drilling where the true vertical depth will be less than 10000 feet.

Shubham B. Patel · 2nd
Petroleum Engineering UG (Sophomore) ||...
2w

Petroleum is generated from productive source rocks that contain high organic carbon content. This high organic carbon content was caused by the burial of plants and microbes, as well as thermal maturation over millions of years, during which diagenesis and catagenesis processes occurred. Diagenesis occurred in the first few thousand years after the burial at temperatures less than 50°C, where oxygen, nitrogen, and sulfur were removed from the organic matter, increasing the organic matter's hydrogen content. Catagenesis reactions took place between 60°C and 200°C, and the organic compounds were subjected to a variety of thermal degradation reactions, resulting in the generation of hydrocarbon. According to the studies, an optimum window for the generation of oil and gas is found to be 90°C-160°C (rarely up to 200°C for dry gas). In most areas, the window begins at burial depths of 3000 ft to 6000 ft and ends at burial depths of 9000 ft to 13000 ft, depending on factors such as the geothermal gradient.

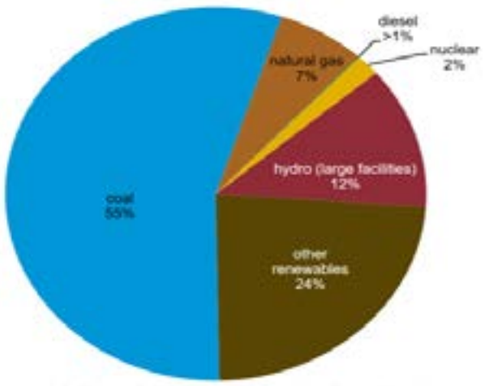
Shubham B. Patel · 2nd
Petroleum Engineering UG (Sophom...
2w

If a region's geothermal gradient is abnormally low, oil and gas shows can be expected at much deeper depths. Furthermore, the temperature in the ultra deep well can reach 180°C at a depth of 39000 feet, implying that oil and gas shows could occur at this temperature. Even though it is frequently referred to as the world's deepest oil well, O-14 in the Chayvo field off the coast of Sakhalin, Russia, is only about 3,300 feet deep when measured by vertical drilling depth (optimum range for oil generation). It does, however, have an impressive length of 49,000 feet, which was achieved primarily through horizontal drilling.

INDIAN OIL AND GAS INDUSTRY

Oil and gas sector is among the eight core industries in India and plays a major role in influencing decision making for all the other important sections of the economy.

India's economic growth is closely related to its energy demand; therefore, the need for oil and gas is projected to grow more, thereby making the sector quite conducive for investment. **The Indian oil and gas market is expected to record a CAGR of over 2.64% during the forecast period, 2020 – 2025.** Factors, such as increasing natural gas pipeline capacity, increasing refining capacity, and increasing demand for petroleum products, are expected to increase the growth for the Indian oil and gas market during the forecast period. However, a huge dependence over imports of crude oil and natural gas for satisfying domestic demand and high volatility of crude oil prices is expected to restraint the growth of the Indian oil and gas market.



India's energy consumption by fuel-2020

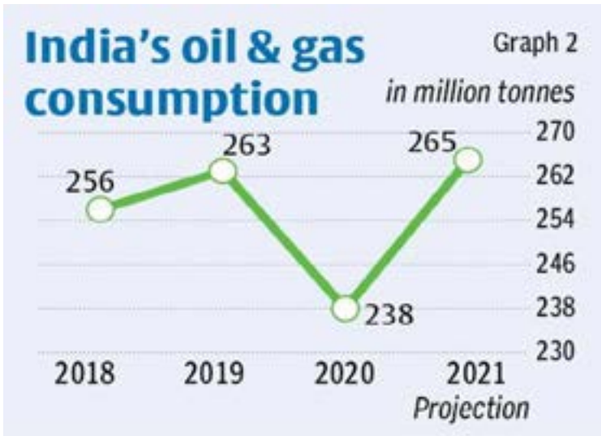
Market overview

India is expected to be one of the largest contributors to non-OECD petroleum consumption growth globally. Crude Oil import rose sharply to US$ 101.4 billion in 2019-20 from US$ 70.72 billion in 2016-17.

1. As of May 01, 2021, the sector's total installed provisional refinery capacity stood at 249.9 MMT; and IOC emerged as the largest domestic refiner, with a capacity of 69.7 MMT.

2. As of December 01, 2020, India's oil refining capacity stood at 259.3 million metric tonnes (MMT), making it the second-largest refiner in Asia. Private companies own about 35.29% of the total refining capacity in FY20.In FY20, crude oil production in India stood at 32.2 MMT.

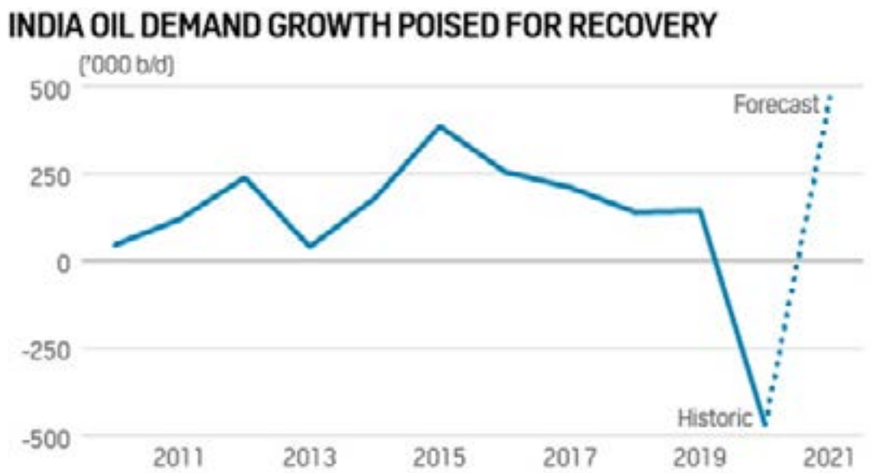
3. In April 2021, the crude oil production stood at 2.5 MMT, while for FY21 it was 30.5 MMT. In FY20, crude oil import increased to 4.54 mbpd from 4.53 mbpd in FY19. Natural Gas consumption is forecast to reach 143.08 million tonnes (MT) by 2040. India's LNG import stood at 33.68 bcm during FY20.



India's consumption of petroleum products grew 4.5% to 213.69 MMT during FY20 from 213.22 MMT in FY19. The total value of petroleum products exported from the country increased to US$ 35.8 billion in FY20 from US$ 34.9 billion in FY19. Export of petroleum products from India increased from 60.54 MMT in FY16 to 65.7 MMT in FY20.

Exports of petroleum products from India reached 55.9 MMT in FY21 from 60.5 MMT in FY16.

As of December 31, 2020, **Gas Authority of India Ltd. (GAIL) had the largest share (69.39% or 11,884 kms) of the country's natural gas pipeline network (17,126 kms).**



Key Market Trends

Downstream Sector to Witness Significant Growth

- The refinery capacity of the country increased, by 3.65 %, Year-on-Year, to 4,972 thousand barrels per day (kbpd), in 2018, from 4307 kbpd, in 2015. The refining throughput increased from 2.9% to 5154 kbpd, in 2018, from 5010 kbpd, in 2017.

- In 2018, new refineries were set to be established in various parts of the country like the Barmer refinery and petrochemical complex being built in Rajasthan, India, and is expected to start refining activities by 2022.
- In 2019, a multi-company deal for a refinery in Maharashtra was signed between **Saudi Aramco, HPCL, BPCL, and ADNOC** touted as the world's largest greenfield refinery when it is fully completed. The deal is expected to be around USD 70 billion, according to the offer presented by the government of India to the respected companies.

Owing to several major upcoming projects for capacity expansion and capacity addition, the downstream sector is expected to witness significant growth owing to upcoming projects of expansion and construction of new refineries.

Investment to Drive the Market

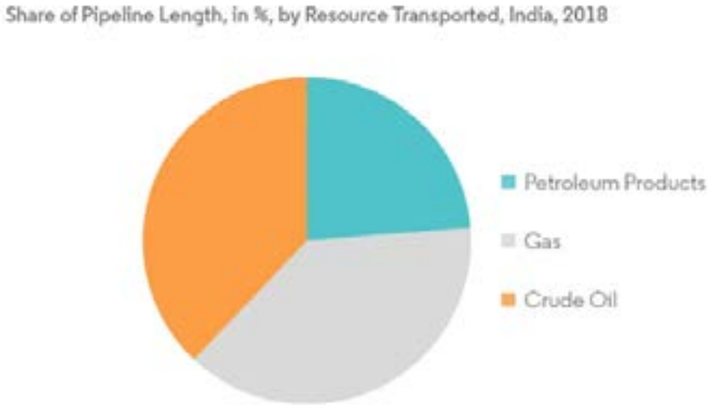
- According to government data, India's natural gas production increased by 22.7% YoY in April 2021, as Reliance Industries Ltd. and its partner, BP plc, increased production in the KG-D6 block on the east coast.
- Pipeline:

In 2019, the world's longest liquefied petroleum gas (LPG) pipeline is expected to be laid, in the forecast period, for approximately 9,000 crore INR. It is expected to take the LPG from three LPG import terminals (at Kandla, Pipavav, and Dahej) and two oil refineries along the route. The LPG will be transported to the LPG bottling plants in the States of Gujarat, Madhya Pradesh, and Uttar Pradesh.

- The capacity of crude oil pipeline increased to 158,911 thousand metric tons (TMT), in 2018, from 145,693 TMT, in 2017. One of the largest capacity crude oil pipelines in the

The capacity of crude oil pipeline increased to 158,911 thousand metric tons (TMT), in 2018, from 145,693 TMT, in 2017. One of the largest capacity crude oil pipelines in the country is the Salaya – Mathura pipeline, which has an existing capacity of 25000 TMT in 2018.

 Hence, investment in the oil and gas sector has been driving the Indian oil and gas market. Pipeline coverage is expected to increase substantially in the forecast period with petroleum product pipeline is expected to increase in the most in the segment.



- In February 2021, Petronet LNG announced its plans to increase in its Dahej terminal's capacity by 29% to 22.5 million tonnes per annum (mtpa) to meet the rising demand.
- Key Indian oil retailers such as Bharat Petroleum and Hindustan Petroleum have announced plans to increase the capacity of their outlets in rural areas in 2021.
- In February 2021, ONGC announced that by May 2021, it would increase natural gas output from a KG basin block to 2.5-3 million standard cubic meters per day.
- In February 2021, the government launched key oil & gas projects in Assam, such as **INDMAX** Unit at Indian Oil's Bongaigaon Refinery, Oil India Limited's secondary tank farm

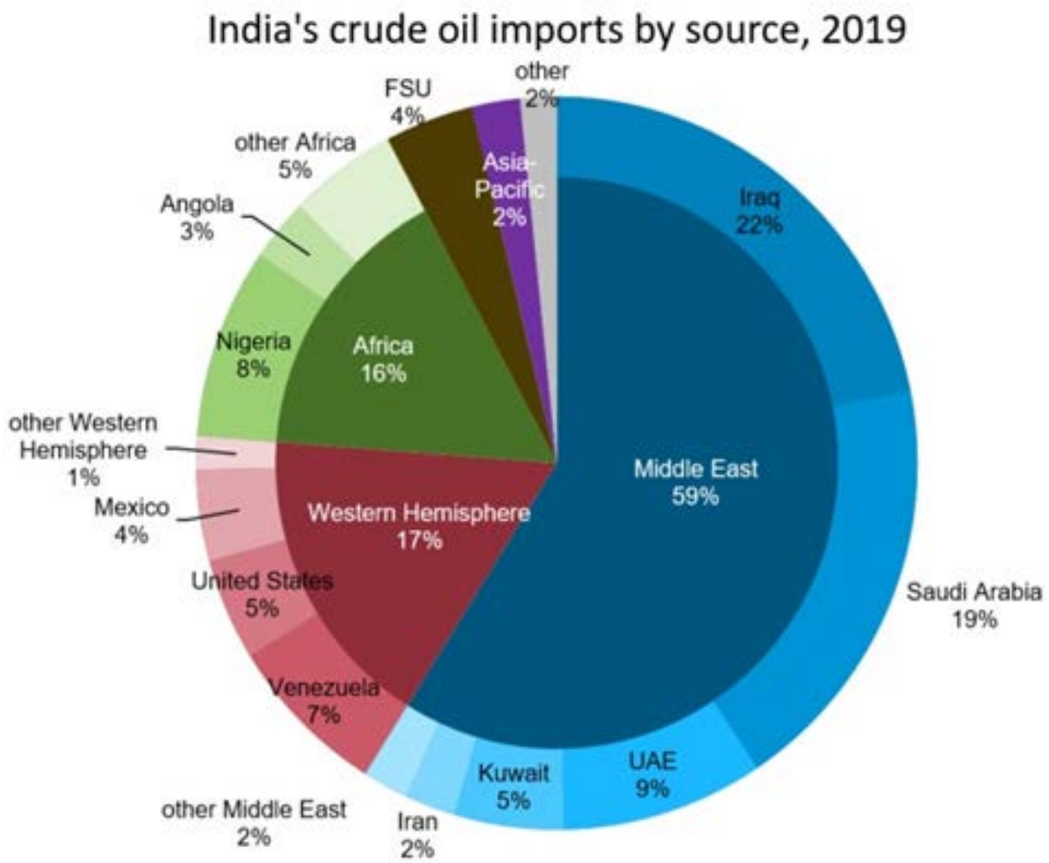
at Madhuban, Dibrugarh and a **'Gas Compressor Station'** at Hebeda Village, Makum and Tinsukia remotely from Dhemaji in Assam.

- In February 2021, the government launched key oil and gas projects such as the Ramanathapuram – Thoothukudi natural gas pipeline and Gasoline Desulphurisation Unit at Chennai Petroleum Corporation Limited, Manali.
- In February 2021, IndianOil Corp. Ltd. signed a 'statement of intent' with Greenstat Hydrogen India Pvt. Ltd. to establish a centre of excellence for Hydrogen value chain and other related technologies such as hydrogen storage, fuel cells, etc.
- Foreign investors will have opportunities to invest in projects worth US$ 300 billion in India as the country looks to cut reliance on oil import by 10% by 2022 according to Mr. Dharmendra Pradhan, Minister of Petroleum and Natural Gas, Government of India.

Oil and Gas imports

India is the second biggest importer of crude oil and its products after China. In the year 2019, US is going to become net exporter of LNG, LPG, crude oil and its products from its shale oil production boom. Shale oil production cost in US would be the higher ceiling price for the crude oil in international trade as its substantial production is consumed internally substituting the imports. India is heavily dependent on crude oil and LNG imports with 82.8% import dependence for crude oil and 45.3% for natural gas/LNG. The net foreign exchange outgo is 63.305 billion US$ in the financial year 2017–18 on account of crude oil imports. India generated 35.2 million tons of petroleum products from indigenous crude oil

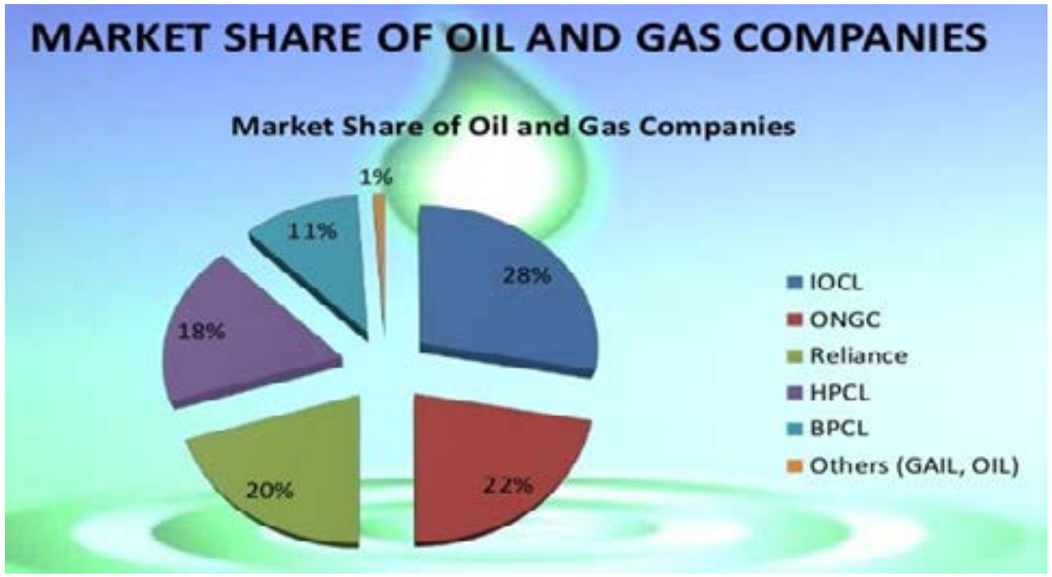
production whereas the consumption of petroleum products is 204.9 million tons. Similarly India generated 31.7 bcm natural gas locally against the consumption of 58.1 bcm. In 2019, India was the fifth largest importer of LNG. LNG price is linked to the prevailing crude oil price in global markets.



Major Players

The production of Oil and Gas is the standard for the growth of economy in many ways and works as the backbone of Indian economy. Different oil and gas companies in India have been vigorously contributing towards the fast growth of the economy of India. They even offer business opportunities to many raw material suppliers as well as they are great source of fuel supplies. Most of the oil and gas companies in the country are Public Sector Undertakings (PSU) organised by Indian Government.

1. Oil and Natural Gas Corporation
2. Oil India Limited
3. Reliance Industries



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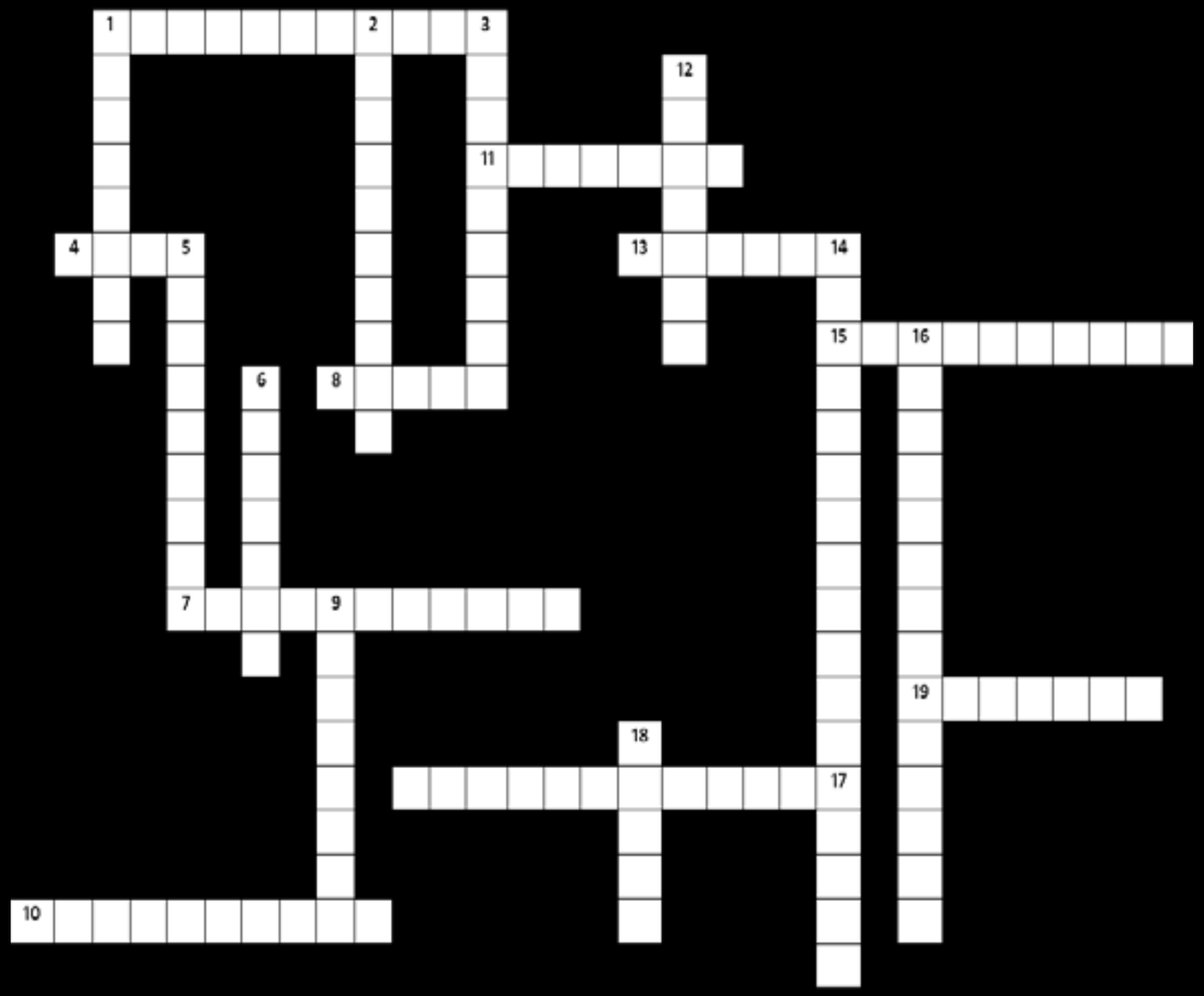
1.Media Reports, Press Releases, Press Information Bureau, Ministry of Petroleum and Natural Gas, Petroleum Planning and Analysis Cell, News Articles, International Energy Agency, BP Statistical Review 2020
2. https://www.mordorintelligence.com/industry-reports/india-oil-and-gas-market

CRUDE-WORD PUZZLE



send your answers to speauactevents@gmail.com to get the solutions and get a chance to win the performer of the month

Across right

1. Intense heat and pressure from below the earth surface forms this type of rocks.
4. The largest section on geological time scale is called as.
7. The rock in which petroleum originate.
8. Systematically curved structure on the surface of rocks are called.
10. The breakdown of rocks through wind , water , chemicals , Animals and plants is.
11. Any geological formations exposed on the surface are called.
13. Fractures that divides rocks into parts or blocks is.
15. Removal of hetero atoms in organic matter happens in.
19. The hardest mineral on earth.

Across left

17. Deposits with fan shaped approximating a segment of cone and exhibit convex-up cross sectional profile.

Down

1. "Time of reptiles" which era?
2. Unit of evolution.
3. From 65 million years ago to present day which era?
5. Most abundant mineral on earth curst.
6. Rocks forms out of magma and lava from the interior of earth.
9. Folds characterized by well-defined sharp hinge points are called.
12. study of origin , history and structure of earth.
14. The low lying area/depression where sediments can be deposit.
16. Determine actual age of rocks or fossils using radioactive decay.
18. "Aeolian" refers to transport and deposition by what?

DAVID K. BASKIN

He is the winner of the lifetime achievement award in the 2020 edition of the **WORLD OIL AWARDS.**

In a career spanning more than 50 years, Mr. David Baskin dramatically impacted how petroleum geochemistry is used to resolve key petroleum exploration and field development problems. Those contributions are documented in the 20 publications that he either authored or o authored on the techniques he pioneered. Mr. David was a pioneer in the application of petroleum geochemistry to the assessment of reservoir continuity. He developed protocols for integrating kerogen miroscopy pyrolysis and elemental analysis data to evaluate the generative potential and generative history of source rock. He also developed geochemistry based techniques which are now widely used to predict fluid type and quality of petroleum accumalations.

Mr. David received a Bs degree in geology from San Jose state university. And continued graduated studies at both California state university at Fullerton and California state university at Long Beach.

David K. Baskin began his career in 1969 as a world site geologist for Exploration Logging INC. David then worked as a petroleum geochemist for nearly 30 years at Chevron's research facility in Lahabra , California. Following his time at Chevron David was vice president for Oil Traces, for 8 years. And

since 2010 he has been a senior petroleum geochemist for Stratum reservoir.

He has been working in the oil business for about half a century and has contributed his longevity to the enjoyment of working with others and in helping to solve practical problems at Chevron Research, at Oil Traces and now a consultant for Stratum Reservoir which was formerly known as Weatherford. He enjoyed applying organic geochemistry to solve both exploration and production questions. Much of his early career was devoted to source rock analysis including vitrinite reflectance .But in the last 30 years he has concentrated in applying gas chromatography to solve reservoir geochemistry problems.

During this time he mentioned that he had a lot of support from numerous colleagues and two of which come immediately to mind are Mr. Bob Jones of Chevron Research and Mr. Mark Mccaffery of Oil Traces have both made a difference in his career and in his life.

Works

1.One of his early works includes his research on the early generation characteristics of sulfur rich Monterary kerogen. This paper documents the critical role of organic sulfur in the early formation of bitumen and oil from a sulfur-rich kerogen from the Miocene Monterey Formation in California.

Hydrous pyrolysis was used to simulate the natural generation of petroleum from a sulfur-rich, type II kerogen from the Phosphatic member of the Monterey shale. The amount and distribution of sulfur in the kerogen, bitumen, and expelled oil generated at various temperatures indicate that (1) initial bitumen and oil generation is directly related to cleavage of weak sulfur linkages, and (2) most of the expelled oil is formed by decomposition of bitumen

and not directly from the kerogen. Finally, comparison of hydrous pyrolysis results with other type II kerogens suggests that the temperature of peak bitumen generation is inversely related to the heteroatom content (primarily sulfur) of the kerogen.

2. Another research of his and his team is predicting gas, oil and water intervals in Niger Delta reservoirs using gas chromatography. Formation evaluation experts usually have little difficulty in interpreting wireline logs to assess the type of reservoir fluid (oil/gas/water) in sand-shale sequences. This assessment is usually accomplished by a combination neutron-density tool that detects low hydrogen and low electron densities typical of gas zones, and the repeat formation tester (RFT), which uses both the pressure gradient and sample acquisition techniques to evaluate reservoir fluid. In the Niger Delta, however, many of the sands exhibit a poor neutron-density response to gas, and RFT testing has been largely eliminated because poor hole conditions commonly result in stuck tools. Oil fingerprinting of residual hydrocarbons from sidewall core extracts can provide an independent means of identifying reservoir fluid type.

In conjunction with the Nigerian National Petroleum Company, they completed numerous chromatographic analyses on solvent extracts of sidewall core samples from various wells in the Mefa field, offshore west Niger Delta. Oil fingerprints of sidewall core extracts clearly reflect the type of hydrocarbons in the reservoir. Fingerprints of oil-saturated sands are typical of topped (C15+) whole oils, whereas fingerprints of hydrocarbons extracted from the gas-dominated sands show an abbreviated hydrocarbon distribution more typical of

gas condensates. Fingerprints of extracts from water-productive intervals show a further abbreviated signature, suggesting that higher molecular weight hydrocarbons did not migrate into these intervals. These signatures are distinct and intact despite poor sample preservation due to prolonged storage of up to 3 yr.

3. He and his colleagues used statistical techniques to identify end members for allocating commingled oil samples produced from unconventional reservoirs. High-resolution GC (HRGC) data can be used to allocate oil samples that are mixtures of different types of oil produced from distinct reservoir zones if end-member samples are available from each zone.

However, it often is difficult to obtain suitable end-member oils from "shale" reservoirs. If core extracts are used for that purpose, the number of potential end-member samples can be too high to easily interpret HRGC data. However, several statistical methods can be used to identify suitable end members using HRGC peak-height ratios. A Hierarchical Cluster Analysis (HCA) assigns oil samples and core extracts to different groups based on the similarity of their composition. This method provides insight about the number of distinct zones in a shale reservoir, but HCA results cannot easily be used to identify end members because a commingled oil sample generally is a mixture of different types of oil assigned to different HCA groups. HRGC peak-height ratios form distinctive patterns on star diagrams that can be used to identify different groups of oil samples and extracts, and relationships between different kinds of patterns can be used qualitatively to identify potential end members.

TECH TALKS

Ms.Tharunya Danabal, Product Analyst at Schlumberger.

Q.What is your role as a product analyst in Schlumberger?

A. I work as a Product Analyst in the Geoscience Data portfolio division of Schlumberger. This portfolio includes multiple products that help customers in the E&P industry manage both well and seismic data efficiently. I am actively involved in designing products that are aligned with the Schlumberger strategy. I interact with the geoscientists and data managers in the client companies, deliver workflow demonstrations, and design solutions based on the feedback. I orchestrate the product deployments for clients across the world. We are constantly on the look for delivering value adding products that help our customers manage well and seismic data more efficiently.

Q.Oil and gas are an integral part of the infrastructure and economy in most countries. From location and extraction, to field work management, to resource transportation - geography plays a significant role in how this industry operates. How GIS is empowering the growth of oil and gas Industry?

TECH TALKS

A. GIS is integrated with different software products that cater to users across the oilfield life cycle. Managing Spatial data without any data loss is a key focus area of our data management products. The concepts of GIS is weaved into most data delivery products now. In new energy transition initiatives, GIS is more relevant in projects where energy resources are to be identified based on lot of geographical, economic and environmental factors

Q.What would be the advanced methods to exploit the unconventional resources in a more economical way?

A. A few years ago, the fracking methodology to tap energy from shale changed the market dynamics drastically. At this point, Energy transition is one of the main avenues of many oil and gas operators. Exploring newer avenues of cost-effective energy resources is the main driving factor in this journey. A lot of focus around developing cost effective methods to produce energy from renewable resources such as hydrogen, solar, wind etc

Q.The cost of data management in the industry is usually extremely heavy as there is a lot of unstructured data generated per minute. What are the technological advancements in reducing the cost of data management?

A. Data management is at the centre of the software products in the oil and gas industry. In this data driven era, there is an industry wide focus into adopting an open source based common data platform called OSDU™. The initiative aims to break down data silos, enable innovation and bring data together in one location. This central approach helps reduce cost on data migration and manage data across several different applications easily. Most products today are built leveraging non-relational databases that fits for unstructured and big data, cloud technologies, and data visualization technologies.

Q.According to the NASA report, Saturn's orange moon Titan has hundreds of times more liquid hydrocarbons than all the known oil and natural gas reserves on Earth, still there is no direct evidence of life just yet. What is your view on this statement?

A. I am no expert on life outside earth. During my bachelor's degree, I was involved in a project with Dr.Sanjeevi Shanmugam from Geology Department. We worked on projects to identify the similarities in the formations on the craters in Mars with some areas on the earth. While we can draw a lot of parallels of similar geological formations and presence of hydrocarbons/water on other planets, I am certain at some point soon, we can except to get answers around existence of life.

Q. Approximately 1 in 10 exploratory wells finds commercial accumulations of oil and gas to justify the costs of drilling and placing it on production. Is there any advancement in exploration methods which can give a higher success rate of getting commercially producible well?

A. There is a continuous focus on optimizing production to survive times when oil and gas prices are fluctuating. Today, software used in the exploration phase help the geoscientists and reservoir engineers to model the economic viability of the drilling contract very efficiently. Ensuring that the simulations are as close as possible to the reality is the key target in the next gen modelling and simulation models.

Q. "You did your bachelors in Geoinformatics from Anna University. What do you think is the scope of Geoinformatics in Petroleum Industry?"

A. My under-graduate engineering program in Geoinformatics has helped me understand several core concepts such as geology, data management, etc. These concepts enabled me to quickly learn the domain topics in oil and gas. Geoinformatics covers a wide array of topics. Mastering these foundation concepts along with the latest technologies in the market can help any-one navigate through the Petroleum industry. I can see a lot of skillsets learnt from the GIS programs be more relevant in the renewables industry moving forward.

Q.What is the importance of women empowerment in oil and gas industry?

A. I am one of the leaders of the Connect Women Pune chapters, and we are actively involved in empowering women and inculcating a diversity mindset in the company. I have been fortunate to interact with women across the company who are focussed on changing gender stereotypes associated with jobs. We organize initiatives that question gender stereotypes, and help women mould their skillsets to be ready for any challenging opportunity.

In Schlumberger, the topic of Gender Diversity began in the early 1990s. Over time, we realized that just welcoming women into a very male oriented industry, without acknowledging the needs of women is not helpful. Today, the focus is on improving the diversity mindset and creating a work environment that fosters diversity and inclusion.

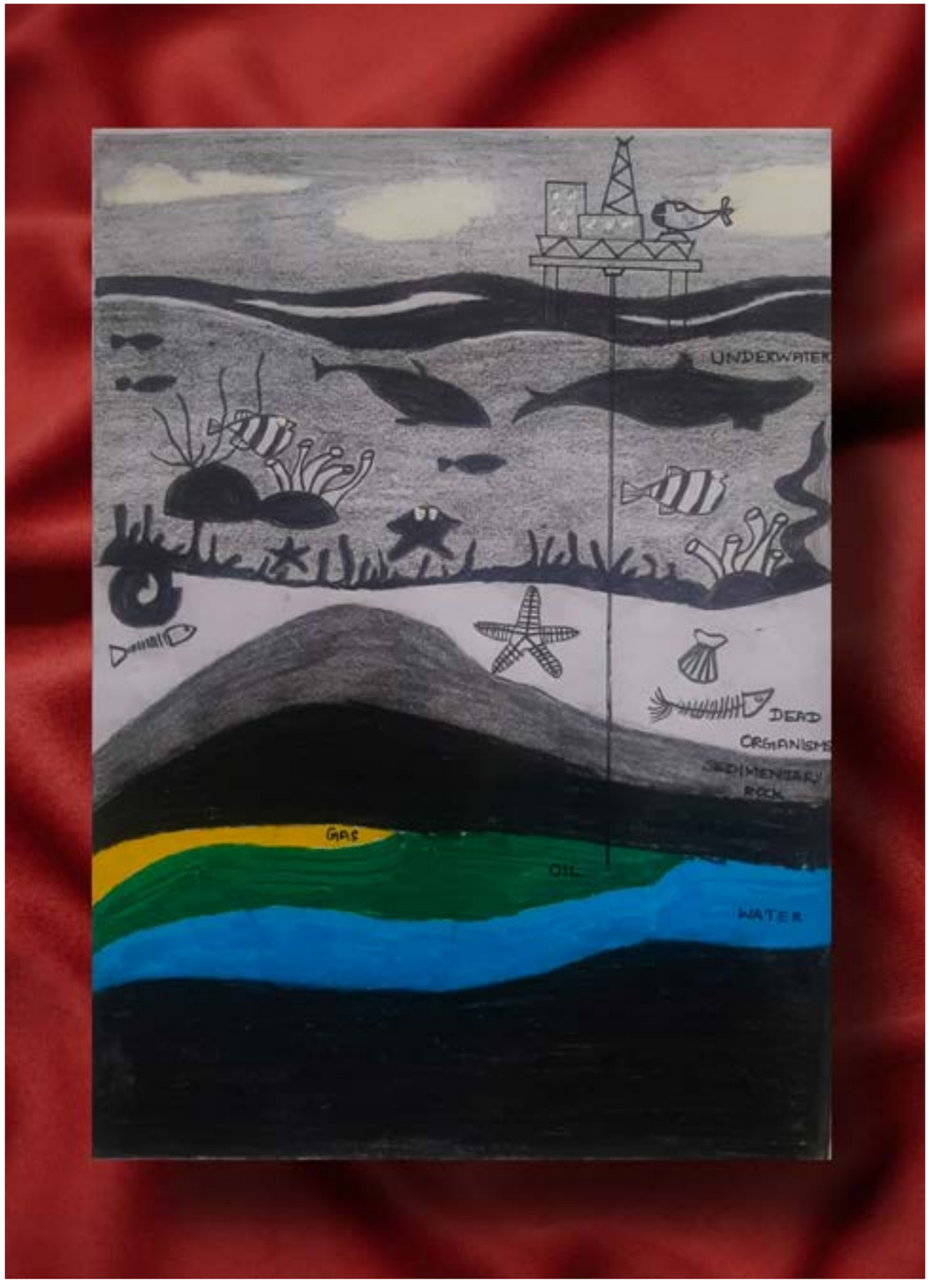
PETRO PICASSO

TOPIC

ORIGIN OF CRUDE

DARSHA M.S

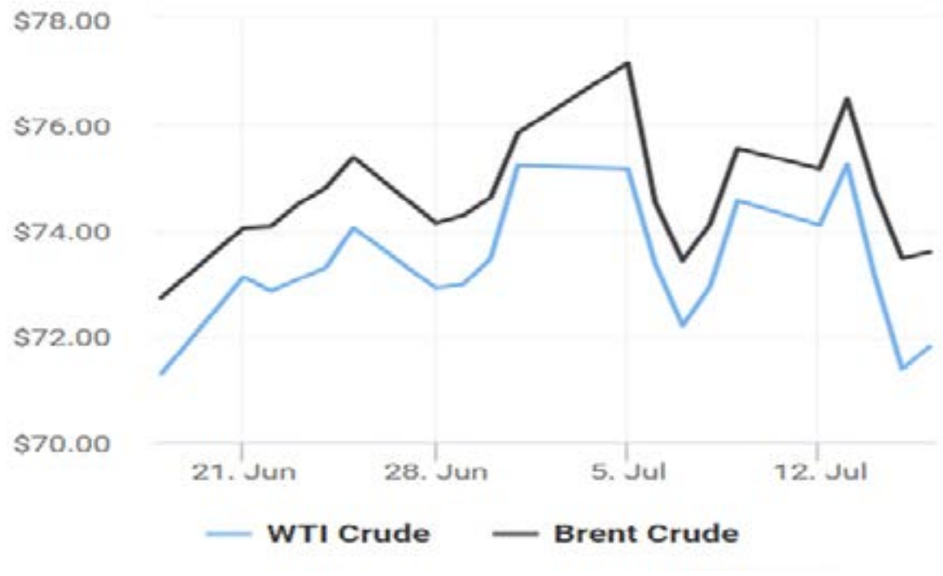
ALAGAPPA COLLEGE OF TECHNOLOGY,ANNA UNIVERSITY.



CRUDE OIL AND NATURAL GAS

INDEX	UNITS	PRICE	CHANGE	%CHANGE	CONTRACT	TIME(EDT)
CL1:COM WTI Crude Oil (Nymex)	USD/bbl.	71.81	+0.16	+0.22%	Aug 2021	7/16/2021
CO1:COM Brent Crude (ICE)	USD/bbl.	73.59	+0.12	+0.16%	Sep 2021	7/16/2021
CP1:COM Crude Oil (Tokyo)	JPY/kl	46,820.00	+80.00	+0.17%	Dec 2021	7/17/2021
NG1:COM Natural Gas (Nymex)	USD/ MMBtu	3.67	+0.06	+1.66%	Aug 2021	7/16/2021

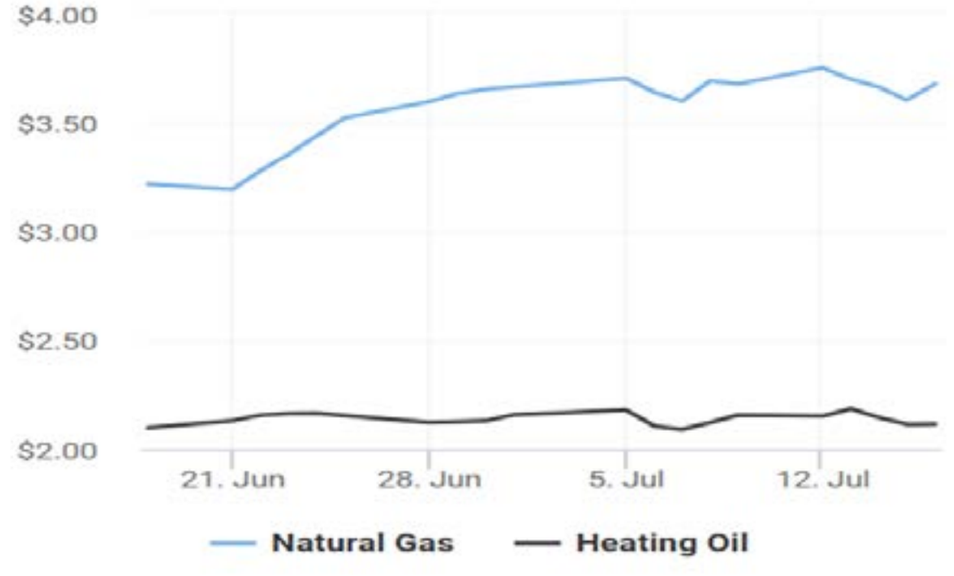
Source: Bloomberg.com/energy



REFINED PRODUCTS

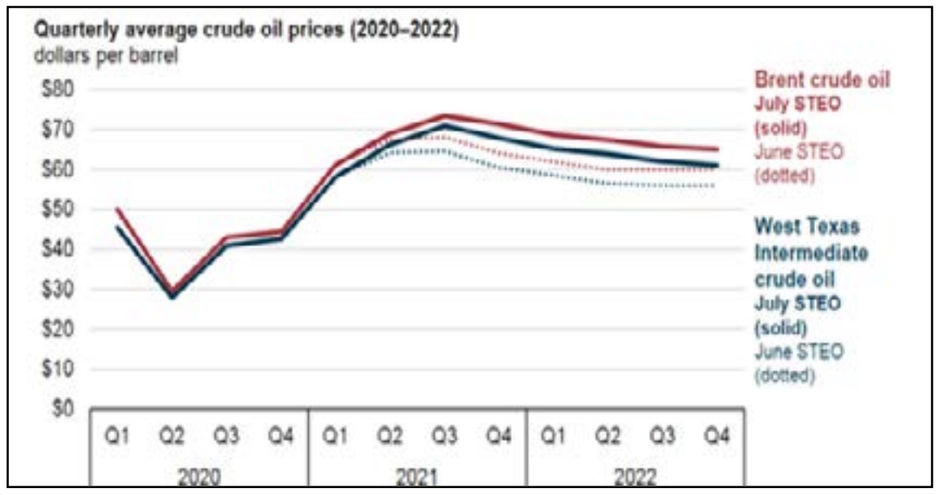
INDEX	UNITS	PRICE	CHANGE	%CHANGE	CONTRACT	TIME(EDT)
XB1:COM RBOB Gasoline (Nymex)	USd/gal.	225.36	+0.33	+0.15%	Aug 2021	7/16/2021
HO1:COM Heating Oil (Nymex)	USd/gal.	211.33	+0.07	+0.03%	Aug 2021	7/16/2021
QS1:COM Gasoil (Nymex)	USD/MT	597.00	-4.25	-0.71%	Aug 2021	7/16/2021
JX1:COM Kerosene (Tokyo)	JPY/kl	61,910.00	-320.00	-0.51%	Jan 2022	7/17/2021

Source: Bloomberg.com/energy



Summary

Index	2019	2020	2021	2022
WTI Crude Oil(USD/bbl)	56.99	39.17	65.85	62.97
Brent Crude Oil(USD/bbl)	64.34	41.69	68.78	66.64
Gasoline (USD/gal)	2.60	2.18	2.85	2.74
Diesel (USD/gal)	3.06	2.55	3.16	3.09
Heating Oil (USD/gal)	3.00	2.44	2.97	3.05
Natural Gas (USD/1000 ft^3)	10.46	10.83	11.24	11.0



Source: U.S. Energy Information Administration, Short-Term Energy Outlook (STEO), July 2021

In the July Short-Term Energy Outlook (STEO), we forecast the Brent crude oil price will average $72 per barrel (b) in the second half of 2021 (2H21) and $67/b in 2022, both $6/b higher than in the June STEO forecast. We revised global production down by 210,000 barrels per day (b/d) in 2H21, leading to larger forecast inventory draws in 2H21 and smaller forecast inventory builds in 2022, which contributes to the increased price forecast. In the July STEO, we forecast the Brent crude oil price will average $73/b in the third quarter of 2021 (3Q21) and will fall to average $71/b in the fourth quarter of 2021 (4Q21). Also in the July STEO, we forecast the Brent crude oil price will fall from an average of $69/b in 2021 (up from $65/b in the June forecast) to $67/b in 2022 (up from $60/b in the June forecast). We also expect West Texas Intermediate (WTI) crude oil prices will likely follow a similar path. WTI crude prices are forecast in the July STEO to average $71/b in 3Q21, $6/b higher than in the June STEO. The July STEO expects WTI prices to be $68/b in 4Q21, up $7/b from the June forecast.

The Brent crude oil price averaged $73/b in June 2021, up $5/b from May. June was the first month when the Brent price averaged more than $70/b since May 2019. We expect moderate downward oil price pressures will emerge beginning in 2H21, when forecast global oil production will rise, causing inventories to draw at a slower pace. Significantly smaller stock draws in 2H21 compared with 1H21 and stock builds in 2022 will likely put downward pressure on oil prices. In the July STEO, we forecast implied global stock draws (the difference between consumption and production) of 210,000 b/d in 2H21, a significant increase from average stock draws of 20,000 b/d in last month's forecast but still significantly less than the average draws of 1.7 million b/d in 1H21. We expect implied stock builds in 2022 will average 460,000 b/d, down from 510,000 b/d in last month's forecast.

PRICE OF CRUDE OIL

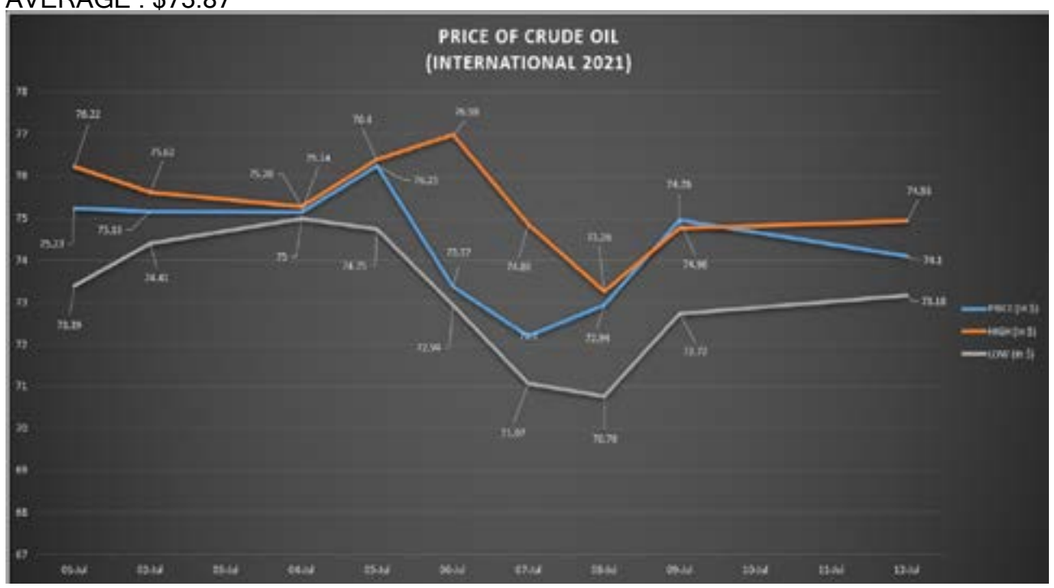
(INTERNATIONAL 2021)

DATE	PRICE (In $)	HIGH (In $)	LOW (In $)	CHANGE (In percentage%)
JULY 1	75.23	76.22	73.39	0.0
JULY 2	75.16	75.62	74.41	-0.09
JULY 4	75.14	75.28	75.00	-0.03
JULY 5	76.25	76.40	74.75	+1.48
JULY 6	73.37	76.98	72.94	-3.78
JULY 7	72.20	74.86	71.07	-1.59
JULY 8	72.94	73.26	70.76	+1.02
JULY 9	74.56	74.76	72.72	+2.22
JULY 12	74.10	74.93	73.16	-0.62

SUMMARY (JULY 1-12)

HIGHEST : $76.98
LOWEST : $70.76
DIFFERENCE : $6.22
AVERAGE : $73.87

***PRICE OF CRUDE OIL PER 1 BARREL**



PRICE OF CRUDE OIL

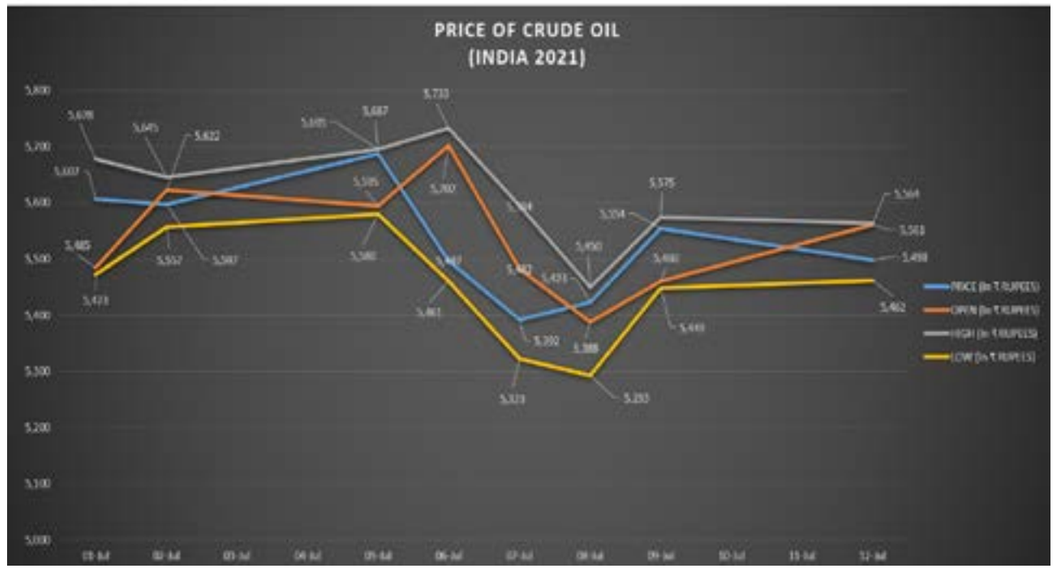
(INDIA 2021)

DATE	PRICE (In ₹ RUPEES)	OPEN (In ₹ RUPEES)	HIGH (In ₹ RUPEES)	LOW (In ₹ RUPEES)	VOLUME
JULY 1	5,607	5,485	5,678	5,473	75.368K
JULY 2	5,597	5,622	5,645	5,557	49.27K
JULY 5	5,687	5,595	5,695	5,580	41.09K
JULY 6	5,497	5,702	5,733	5,461	1112.39K
JULY 7	5,392	5,482	5,594	5,323	154.57K
JULY 8	5,423	5,388	5,450	5,293	103.40K
JULY 9	5,554	5,460	5,575	5,449	63.80K
JULY 12	5,498	5,561	5,564	5,462	60.39K

SUMMARY (JULY 1-12)

HIGHEST : ₹5,733
LOWEST : ₹5,293
DIFFERENCE : ₹440
AVERAGE : ₹5,513
CHANGE : +2.89%

***PRICE OF CRUDE OIL PER 1 BARREL**



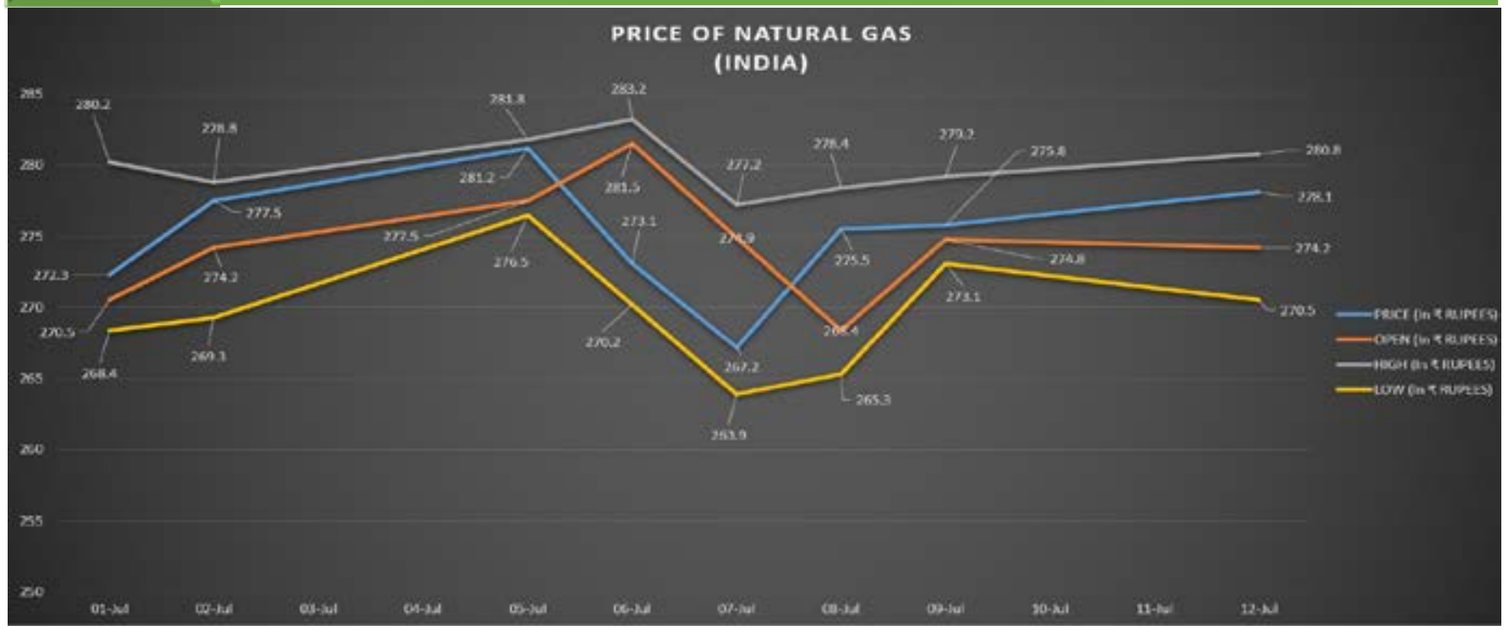
WHAT'S THE PRICE ?

PRICE OF NATURAL GAS

(INDIA 2021)

DATE	PRICE (In ₹ RUPEES)	OPEN (In ₹ RUPEES)	HIGH (In ₹ RUPEES)	LOW (In ₹ RUPEES)	VOLUME	CHANGE (PERCENTAGE%)
JULY 1	*272.30*	*270.50*	*280.20*	*268.40*	*242.68K*	*0.0*
JULY 2	*277.50*	*274.20*	*278.80*	*269.30*	*173.91K*	*+1.91*
JULY 5	*281.20*	*277.50*	*281.80*	*276.50*	*103.95K*	*+1.33*
JULY 6	*273.10*	*281.50*	*283.20*	*270.20*	*177.09K*	*-2.88*
JULY 7	*267.20*	*274.90*	*277.20*	*263.90*	*194.04K*	*-2.16*
JULY 8	*275.50*	*268.40*	*278.40*	*265.30*	*207.8K*	*+3.11*
JULY 9	*275.80*	*274.80*	*279.20*	*273.10*	*147.00K*	*+0.11*
JULY 12	*278.10*	*274.20*	*280.80*	*270.50*	*172.71K*	*+0.83*

SUMMARY (JULY 1-12)
HIGHEST : ₹283.20
LOWEST : ₹263.90
DIFFERENCE : ₹19.30
AVERAGE : ₹273.55
CHANGE : +5.47%



PetroRiddles

HINT

- It is resistant to erosion and can either be bedded or unlayered
- It is less soluble than weak acidic groundwater.
- It has a stochiometric ratio of nearly equal amounts of magnesium and calcium.

HINT

- It is the most common source rock for hydrocarbons
- It has a special property called fissility (tendency to split into thin layers)

HINT

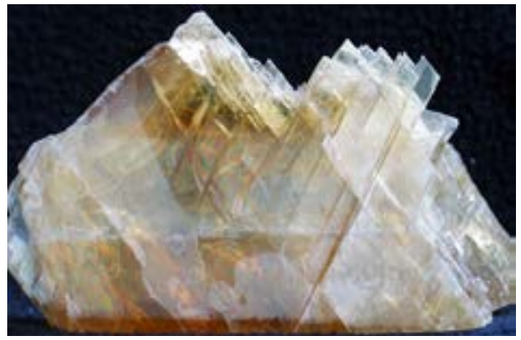
- Over 90% of volcanic rocks found all over the world are these rocks.
- This rock covers over 80% of planet Venus surface.

HINT

- It is a clastic sedimentary rock composed mainly of small sized silicate grains.
- It has been widely employed in constructing temples,homes and other buildings.

HINT

- It often contains fossils and these fossils provide scientists valuable information about the ancient environment, evolution of life etc...
- It is used as a building material,a component for concrete,an aggregate for the base of roads etc...



HINT

- It is widely mined and used as a fertilizer.It is also the main constituent in many forms of plaster, blackboard/sidewalk chalk, and drywall.
- As alabaster, a material for sculpture, it was used especially in the ancient world before steel was developed, when its relative softness made it much easier to carve.
- It is a soft sulfate mineral composed of calcium sulfate dihydrate.

HINT

- It is the second most abundant mineral in Earth's continental crust, after feldspar.
- It is extracted from open pit mines.
- The value of this mineral in Mohs scale of hardness is 7.

HINT

- It is common in the Earth's continental crust, where it is found in various kinds of igneous intrusions.
- It is formed from silica-rich (felsic) magmas.
- It has poor primary permeability overall, but strong secondary permeability through cracks and fractures if they are present.

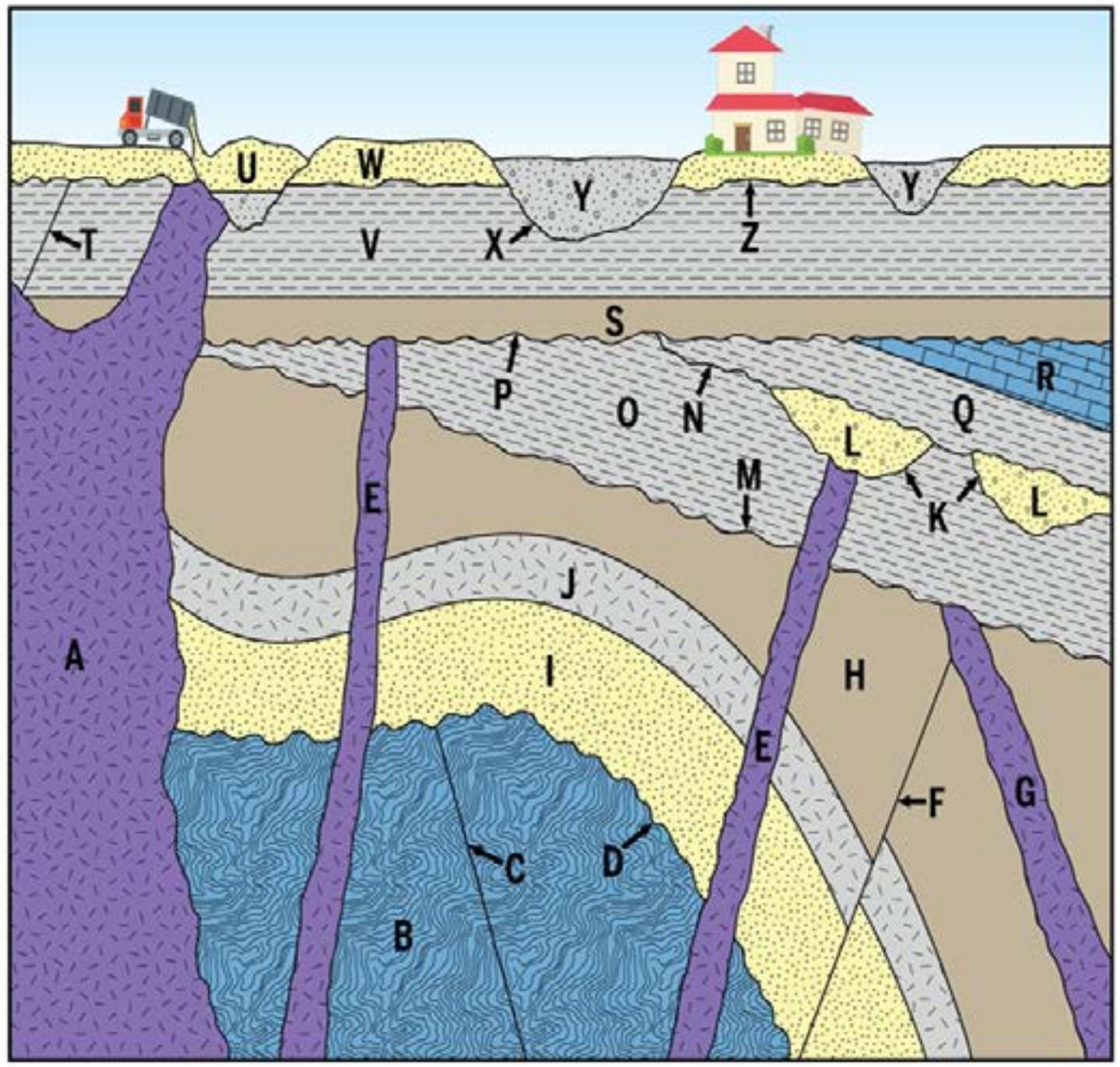
HINT

- It is a volcanic rock that consists of highly vesicular rough textured volcanic glass, which may or may not contain crystals. It is typically light colored.
- It is considered as a volcanic glass because it has no crystal structure.
- It is an abrasive material that can be used in powdered form or as a stone to remove unwanted hair or skin.

HINT

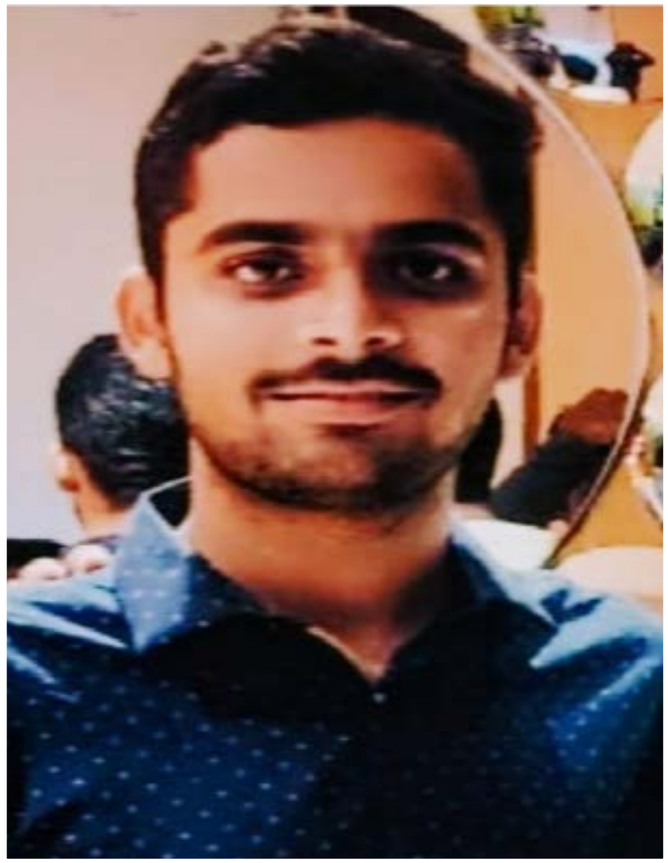
- It often referred as brown coal.
- It is mined all over the world and used almost exclusively as a fuel for steam-electric power generation.
- It has a high content of volatile matter which makes it easier to convert into gas and liquid petroleum products.

Find the order of formation of rocks from oldest to youngest.



Send your answers to speauactevents@gmail.com to get the solutions and get a chance to win the performer of the month.

EXPLORER OF THE MONTH



Deepansh Mishra
Rajiv Gandhi Institute of Petroleum Technology
Explorer of the month June 2021

EXPLORER OF THE MONTH

Shubham B. Patel
Pandit Deendayal Energy University
Explorer of the month July 2021

WAS IT AN ACCIDENT OR MERE NEGLIGENCE?

WHAT'S REALLY HAPPENED IN THE GULF OF MEXICO?

The Gulf of Mexico's surface was on fire because of dereliction of the Mexican state-owned petroleum company **PEMEX.** This is not the first time this kind of incident took place, the recent explosion occurred in 2019, which killed 137 people which wasn't a long time ago. Like other issues this is not that simple where things get back to normal in a short period. In fact it takes time and it's a global matter of concern.

"PEMEX "Who are they?

Petroleos Mexicanos, popularly known as PEMEX is a Mexican state-owned petroleum company operated by the Mexican government which was formed in 1938 by Lázaro Cárdenas. This company had assets worth around $101.8billion in December 2019 and as of 2009 this company was Latin America's second-largest enterprise by annual revenue, surpassed only by Petronas, a Brazilian national company. There have been many unnoticed complaints about the firm which led to the downfall. Though there weren't enough resources the company never minded exploring new reserves. It is expected that companies involved in exploration should have the proper infrastructure and employees. But firm planning which is not formulated in the right manner. This company is said to be the 7th most polluting in the world according to the magazine "The Guardian". This has put the environment and the

employees' lives at stake and the recent incident has proved the company's negligence. In Feb 2015, the company's budget was cut down without any concrete reasons specified which was approved by the Mexican congress. In December 2019, the company found a deposit in southeast Mexico that could produce 500 million barrels of crude which are considered the largest discovery in more than 30 years. Although this company has vast exploration, it is the most indebted oil company in the world. Despite the arising obstacles, the company always finds a way to get back in the game no matter what. Here is a statement by president Cardenas which established the nationality of PEMEX "I ask the entire nation to furnish the necessary moral and material support to face the consequences of a decision which we, of our own free will, would neither have sought nor desired. "

'EYE OF FIRE' IN THE MIDDLE OF THE OCEAN

On 2021 July 2nd , due to an intense storm followed by rain and lightning the company closed the pumping stations that serve the offshore rig near "Pemex' Ku MaloobZaap oil development" where the fire occurred. Simultaneously there was a leak in the underwater pipelines which reached the surface of the ocean and got ignited by the lightning bolt around 5.15 am local time. The reason for the leak is still a nightmare. Even the impact on the environment hasn't been figured out yet.

The company said that a chain of events took place which wasn't under their control. The company believes that there is no crude oil spill and says that they have brought the gas leak under control about five hours after the incident. Fortunately, there are no victims till now. The Ku MaloobZaap is located just up from the southern rim of the Gulf of Mexico and is Pemex's biggest crude oil producer, accounting for more than 40 per cent of its nearly 1.7 million barrels of daily output. Mexico's oil safety regulator Angel Carrizales' tweet wasn't even logical which says that there wasn't an oil spill due to the event and there is no proper explanation to the 'eye of fire' till now. Many videos of this accident surfaced online within minutes of its commencement. The name 'eye of fire' was given because the scene looked like a ball of fire emerging from nowhere in the middle of the ocean. The massive flames raged very close to Pemex's largest oil crude producer - the Ku MaloobZaap platform. Since such accidents aren't new to the company, the remedial measures were enough to put off the fire but it didn't prevent the occurrence, which should have been taken into consideration in the first place.

ENVIRONMENTALISTS SLAM MEXICO

Environmentalists criticized Mexico's state-owned oil company the next day after the gas leak at an underwater pipeline which unleashed a sub aquatic fireball that appeared to boil the waters of the Gulf of Mexico.

Greenpeace a global network of independent campaigning organizations said that the accident appeared to have been caused by the failure of an underwater valve and this incident illustrates the dangers and drawbacks of Mexico's policies about promoting fossil fuels.

President Andres Manuel Lopez Obrador has encouraged heavily on drilling more wells and buying or building oil refineries. He touts oil as "the best business in the world."

Greenpeace wrote in a statement that the fire, which took five hours to extinguish, "demonstrates the potential and serious risks that Mexico's fossil fuel model poses for the environment and people's safety."

Netizens were not only terrified but were angry as well. They pointed out the environmental damage the leak is capable of causing. "All I can think about is the poor marine creatures affected by this.. . Humans have grown to be so destructive. We humans are not worthy stewards of this earth," one user said.

"Apocalyptic scenes," another user stated. Some were even reminded of 'Percy Jackson' books and movies as they saw the ring of fire engulfing the water body.

It is still unclear about the extent of environmental damage the gas leak and oceanic fireball has caused.

PREVIOUS INCIDENTS

Pemex is no stranger to such accidents. It has an unfortunate long record of industrial mis-happenings like these in its premises. They are yet to investigate the cause behind it.

1. On January 31, 2013, an explosion occurred at the administrative offices of Pemex in Mexico City. At least 37 people were killed and 126 were injured. The cause has not been confirmed yet..

Local media reported that machinery exploded in the basement of an administrative center next door to the 52-story Pemex tower.

2. On April 1, 2015, a fire occurred on platform Abkatun A in the southern Gulf of Mexico which killed 4 workers.

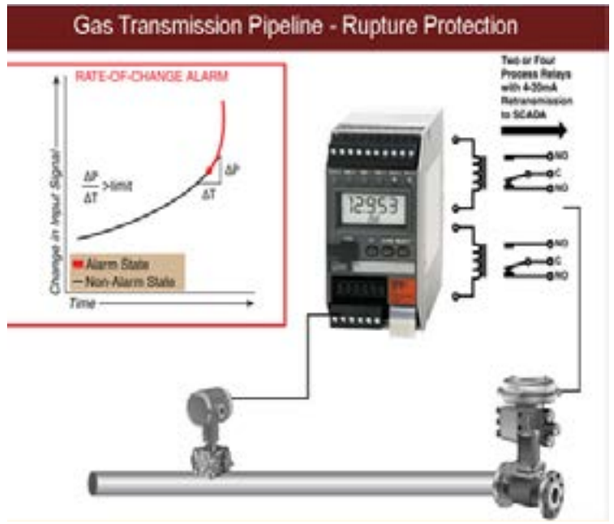
3. On April 20, 2016, a large explosion and fire at the company's Chlorinate 3 plant in Coatzacoalcos killed at least 28 people.

4. On January 18, 2019, an explosion occurred on a pipeline passing through the village of Tlahuelilpan, Hidalgo killing at least 137 people. Several hundred people were gathered around an illegal pipe drain in order to get fuel. Images of the event show people collecting fuel with buckets and small containers from a waterfall of gasoline. Military and police forces were present during the event for several hours before the explosion but were unable to stop the people from stealing fuel. The pipeline was not closed on time even after the fuel drain was reported.

REMEDIAL MEASURES

High pressure natural Gas pipelines criss-cross every continent, and many countries. The United States alone has more than 200 existing natural gas pipeline systems, which together form a network of nearly 500,000 km of gas transmission. These pipelines need to mitigate the risk of explosion due to pipeline ruptures. There are several possible causes of failure. External interference is historically the main cause of loss of gas and accounts for about 40% of all incidents leading to a release of gas. Corrosion accounts for up to 15% of all historical incidents, and material failure / construction defect is known to account for up to 15% of all incidents.

Automatic protection systems are employed to close valves and prevent the



release of gas in the event of a pipeline break. These systems are critical to safe, economic operation of the pipelines. **A proven reliable method to identify a pipeline break is to detect the "abnormal" value of the rate of pressure drop (DP/DT) relative to values established during the normal operation of the pipeline. An alarm trip is used to monitor these conditions and alert the control system when set parameters have been exceeded.**

The Moore Industries SPA2 Alarm Trip continuously monitors pipeline pressure dynamics to provide early detection of pipeline pressure changes. The alarm trip can be used to provide operator warnings or initiate valve execution. Closure of the Main Line Valve on either side of the leak can be triggered automatically by an excessive sustained sudden drop in line pressure. These systems, used in conjunction with other devices and systems, can mitigate a rupture. The SCADA system, which includes telemetered data from the valve stations, keeps the operator informed of abnormal events giving him the option to take further action.

KEY ATTRIBUTES

1. Rate-of-Change alarming and absolute pressure alarming can be combined in a single unit
2. Up to four SPDT relays rated at 5A 250VAC/24VDC
3. Suited for installation in Class I Div 2/Zone 2 locations

Reference-www.independent.co.uk

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