AAPG Explorer
January 2026

The High Price of Cheap Energy

See page 6.

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The Fengning Pumped Storage Hydropower plant in China. Photo courtesy of the State Grid Corporation of China. See the full story on page 6.

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Regular Departments

Universities, Geoscience Programs and National Security

How AAPG can address the imminent skills gap

By BRIAN W. HORN

"You go to war with the army that you have." –Donald Rumsfeld

For those who can remember the first Iraq war, the sudden escalation and conflict came as a shock to many Americans, who had not seen the United States engage in armed conflict in decades. Overnight, CNN became "the war channel," chronicling all the events that took place during the short-lived conflict.

The stated reason for the war was to stand up for a sovereign nation, people and its economy, but a large part of global oil supply was threatened by Iraq's invasion of the sovereign nation of Kuwait, which invited much of the political criticism that the war was only about oil.

Today, that conflict is a distant memory and many people in the West don't give this and the subsequent events much thought. Most young professionals in industry were not born and did not experience the devastation nor understand how many people were displaced or perished. (But I'm sure my friends in Kuwait have a very different perspective on the effect it has had on their society and global worldview.)

In sharp contrast, global tensions between nations today and the resultant need to consider the security of the energy supply and critical minerals is so constant that past events fade into the background. Public dialogue routinely emphasizes energy security and for all countries it has become an area of acute concern and focus. These metals and the energy to process and manufacture them are critical to building and maintaining national security, the economy, and infrastructure.

I noted in my column in December that "energy is the economy," and given the growth projections, more energy will be required to not only sustain the current economy but also enable it to grow for future generations to flourish.

The Looming Skills Gap

The question is … How will this happen? What are the skills needed and who are the people who will step into this arena, not only to sustain current energy sources, but to develop new ideas and technologies to meet the requirements needed to maintain energy sources and security?

Many geoscience programs have either been shuttered or dramatically downsized (a situation being addressed by a recently-launched AAPG initiative). Whether low enrollments should be blamed on policy changes by governments or by university administrators, societal pressure to decarbonize, or limited funding is all up for debate, but what isn't controversial is that geoscience is the backbone of the energy industry. And, while many people believe AI will make up the difference by expediting this technical discipline, it most certainly will not replace it. This will be the focus of the upcoming International Petroleum Technical Conference in Dubai, which I will attend, and I endeavor to take advantage of the opportunity to discuss future geoscience training.

It's worth noting that geoscience and earth science are non-unique. Geoscience and earth processes are often anisotropic with many unknown variables. In virtually every sector of industry and science, we build models to distill or simplify problems and provide a context for analysis using high-power computing. The advances in computing have been exponential, improving the speed and size of the analysis, but as the renowned statistician George Box noted, "All models are wrong, but some are useful." I fear we are putting more trust in computer analytics rather than a sober

thoughtfulness and understanding of where models lead and the voracity of the data that create them.

So how do we influence the path forward?

Fundamentals are still the key. A solid foundation in the principles of structure, sedimentology, petrology, mineralogy, paleontology, and geochemistry is essential. It isn't necessary to be an expert in all these disciplines, but a basic understanding is critical as geoscience is about integrative thinking: taking disparate pieces of information and weaving thoughts or ideas on new ways to approach problems. This is what universities must continue to teach at the undergraduate level.

In addition to promoting the fundamentals, we need to help facilitate AAPG members' contributions and provide opportunities to be involved in graduate students' training. An outside adviser with decades of experience can be a valuable and influential voice outside of students' instructors and peers, whom they can use as a sounding board, as someone who has been through the process they are beginning to undertake. I also believe we need to leverage AI technology and use it as a tool to help train the next generation of geoscientists in the skill of critical thinking and observation. New AI technology can be used to capture decades of sound geoscience work and provide an easy way to access and present these findings.

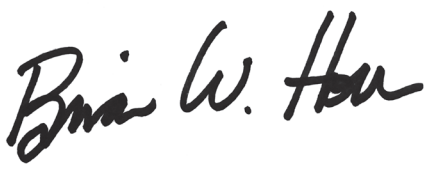
Going forward, I hope to engage the AAPG Foundation, membership and alumni at as many universities as possible to begin to make inroads into geoscience curricula and highlight the different divisions within AAPG – the Energy Mineral Division, Division of Environmental Science, and the Division of Public Affairs – as testament to the wide diversity of industry sectors and employment opportunities encompassed by the geosciences. AAPG has a wide range of offerings and a broad fund of knowledge in our membership that could partner with universities and help guide their geoscience curricula. We can lead the world in this endeavor.

Like many others, our industry has a history of cyclic ups and downs. The problem this creates for us is that students at universities look at these cycles and question why they would pursue a career that could last fewer than three to five years before they are made redundant by a merger or downsizing. The COVID-era media blitz, demanding decarbonization, has dominated much of social media and many times is not factually complete. Until recently few energy transition advocates, counted the cost to the consumer and to the world, which is why many nations have serious concerns about energy security and future economic growth.

The Army We Need

Where do we stand? The pipeline of geoscience students is sparse, currently, and industry is chasing fewer candidates. This is "the army that we have" but it is not the one we are going to need for the future. Energy security has become a global focus. Petroleum demand has only increased, but there are also critical minerals, mining of metals, environmental assessments and impacts that must be done in unison if the world is going to continue to flourish and bring more people out of energy poverty.

AAPG will continue to work toward building bridges with universities and we would welcome members and alumni partnering with us to make these inroads. I will be reaching out to schools and geoscience programs to find areas of collaboration and ways in which students and faculty can be supported by AAPG. In the era of downsizing and budget shortfalls, a small army of volunteers can have a big impact.



The Mekong Power Trade-Off

Cheap electricity comes at a high cost on southeast Asia's Mekong River

By BARRY FRIEDMAN, EXPLORER Correspondent

As with most energy sources, hydropower is both under- and over-appreciated and replete both with onerous side-effects and great promise.

"Hydropower," of course, refers to the process of using the energy of moving or falling water to generate electricity or to power machinery.

According to the International Energy Agency, at present, hydropower's contribution to the worldwide energy mix is 55-percent higher than that of nuclear power and larger than that of all other renewables combined, including wind, solar, bioenergy, and geothermal. Specifically, hydropower supplies about 17 percent of global electricity generation, the third largest source after coal and natural gas. Over the last 20 years, thanks to the enormous building of damns, hydropower's total capacity rose 70 percent globally, even while its share of total generation stayed stable due to the growth of other sources.

While India, Brazil, Canada, and the United States are significant players in the world's hydropower landscape, China far and away has the world's largest hydropower capacity. The country, in fact, recently completed the $1.87-billion Fengning Pumped Storage Power Station, the world's largest pumped-storage facility.

And no place more than the Mekong River – the 12th-longest river and the third-longest in Asia, which runs through Southwest China (where it is officially called the Lancang River), Myanmar, Laos, Thailand, Cambodia, and southern Vietnam – exemplifies the complex dynamic of hydroelectric power.

The Promise

The Mekong has the world's largest inland freshwater fishery industry and is vital to the region's food security. Its biological habitat provides diverse livelihoods as well as four fifths of the animal protein for more than 60 million people. All the riparian countries – those on banks of the water, are involved in the construction or support of such dams along along the Mekong's 3,000 miles. China – which is building and has built the largest dams, specifically the Nuozhadu and Xiaowan dams – has the largest footprint. It currently has 11 on the mainstream and dozens on the river's tributaries. Laos, too, has built on the mainstream

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A fisherman in the Mekong River, Thailand

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and on tributaries. Thailand, meanwhile, invests in Laotian dams, while Cambodia concentrates its activities outside the Mekong River Basin. Its dam, Lower Sesan 2, accounts for 20 percent of the country's energy needs.

The Downside

While the dams provide cheap electricity, there is a concern that they are destroying the river by altering natural flow, trapping sediment, and fragmenting ecosystems, which lead to a loss of habitat for fish and other aquatic species. Further, the dams can also change water quality, block fish migration, and disrupt the natural process of flooding that replenishes floodplains.

One of the ironies is that while concerns about human-induced climate change have boosted their construction (hydropower is considered a "green" or renewable" energy) many believe dams are actually causing more damage to the environment than the effects of climate change they were supposed to offset. All that water rushing through those turbines of all those dams produce billions of tons of carbon dioxide, with much of these greenhouse gases released in the form of methane.

At least 25 percent of today's global warming is caused by methane emissions.

"The immediate issue and biggest concern now in the Mekong is the trade-off between economic development and the environmental impacts."

That's Zijian Luo, who is working on her doctorate in international politics and conflict resolutions at the University of Coimbra in Portugal and has been studying the intricacies of the cultural, political, and economic dynamics of the Mekong for years.

And all roads, to mix transportation metaphors, lead back to China.

"For instance, China has more privilege in these hydropower projects as the upper Mekong generates more electricity," she said.

She said that people in the Mekong region in all countries want the social and environmental impacts to be addressed properly, "instead of being downplayed by policymakers who wish to build more hydropower dams."

Luo believes, as do many others, there is no absolute clean energy or green alternative that will meet people's needs – and, perhaps more tellingly, in the abundance they need it. Hydropower is no exception, especially in underdeveloped countries where livelihood is mostly sustained by agriculture.

Luo said one of the problems is that dam construction often follows a one-size-fits-all mentality.

"The Mekong states are heavily dependent on foreign funds, mostly from the western countries. Australia and Japan and other European countries are taking a big stake, and the United States also has agreements and projects there too," she explained.

She said energy policies and models do not always fit the special circumstances of these riparian nations.

"The good practice from the West may not be sustainable in the Mekong in the long run. The knowledge of local communities should be valued," she said.

Specifically, along the Mekong, dams trap sediment, leading to coastal erosion and nutrient loss in the delta, while their reservoirs flood forests and wetlands. These changes, in a very real sense, threaten the lives of those downstream.

But of course, the dams provide cheap, reliable energy.

A village along the Mekong River, Laos

The Fengning Pumped Storage Hydropower plant in China. Photo courtesy of the State Grid Corporation of China.

According to a 2022 study by the International Renewable Energy Agency, the global weighted average of electricity of new utility-scale hydropower in 2021 was 11-percent lower than the cheapest new fossil fuel-fired power generation option.

Countries like Laos are building dams that might not even be needed, as they see such construction as a way to generate revenue, power their economy, and become what is being called "the battery of Southeast Asia."

The Mekong River, according to the Mekong-U.S. Partnership Project, ranks third worldwide for biodiversity and in its study completed in 2021, entitled "Investigating Energy Alternatives to Hydropower," it found that the anticipated benefits of three proposed Lao dams – Xayaburi, Don Sahong, and Pak Beng – would not make up for losses in fisheries, biodiversity, and livelihoods.

Power and Politics

Luo, who is from China, said those who work and live along the river are opposed to such dam building, but people from different riparian states have uneven power to stop construction in the Mekong region.

"Mass protest is still not a very popular practice in Southeast Asia, and often protesters are running high risk of being arrested," she said.

The Xayaburi Dam in Laos was protested for years, but was not successfully halted and the dam was finished in 2019.

It is now in operation.

Further, in terms of energy production and footprint, while hydropower does not emit greenhouse gases as, say, fossil fuels do, its high upfront costs, environmental impact from dam construction, and limited expansion potential are drawbacks.

Luo, whose thesis is entitled, "Transnational Environmental Movements and their Impact on Regional International Society in the Mekong River Region," said her work investigates the transnational networks and grassroots movements on one hand, and on the other, aggregates NGO reports, government and intergovernmental reports, transnational agreements, and conventions regarding the management of the Mekong River to uncover the goals, values, and effects on environmental norms on dams in the region.

The Mekong isn't the only source of energy or wealth. Mineral resources including gold, copper, lead, zinc, phosphate, potash, oil and gas, coal and gemstones – much of it unexploited – presents explorationists with almost unimaginable possibilities.

Considering electricity demand will rise much faster than overall energy demand in the years ahead, hydropower will play a pivotal role, whether future damn construction continues or not. For people like Luo, it's important that those tasked with hydropower construction understand that their work cannot be done in a vacuum.

Saying the advantages of hydroelectric power – ethically, culturally, and financially – are often "anthropocentric," she cautioned: "States are not the only governors of the shared river. The Mekong people should have a say in it as they are the bearers of these politics, too."

Energy Markets Navigate Tariffs, Wars, AI Transformation

2025 year in review

By DAVID BROWN, EXPLORER Correspondent


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Last year started with a chorus of "What if?" in the oil and gas industry.

What if Donald Trump really does put tariffs on dozens of countries? What if conflict in the Middle East extends to bombing Iran? What if oil prices fall but industry costs keep climbing? What if OPEC+ starts easing its production limits?

The year ended with a chorus of, "Yeah, that happened."

In 2025, natural gas prices rose and global oil prices fell. Crude production surged, and in multiple countries. Explorers found success around the world. Gaza got an agreement while Ukraine got complicated. Bumerangue returned a winner for BP offshore Brazil. And the question of the year might have been, "What now?"

How the Year Started

Kuwait Oil Company announced in January it had discovered an estimated 800 million barrels of oil and 600 billion cubic feet of associated gas at the Al Jlaiaa/Al Julaiah offshore field in Kuwaiti waters. That kicked off a reasonably good year of exploration results for the industry.

Trump became U.S. president, again, and wasted no time introducing new tariff actions.

On Feb. 1, the White House imposed 25-percent tariffs on most goods from Cananda and Mexico, then suspended them on goods that complied with existing trade agreements. That kicked off several rounds of U.S. tariff announcements, revisions and reversals. Financial experts called the U.S. tariff situation "complex."

In March, Repsol announced it would combine its North Sea upstream business with NEO Energy Group. The resulting joint venture would have estimated production of about 130,000 barrels of oil equivalent per day. It expanded even further late in 2025 when TotalEnergies revealed plans to merge its British North Sea assets into the mix.

NEO NEXT+, the combined company, was expected to become the largest independent in the UK with production of more than 250,000 boe/d. The moves were part of an ongoing industry-wide trend toward restructuring and merging producing assets. Analysts said the North Sea combination reflected an attempt to deal with an aging basin and a challenging regulatory and tax environment.

China National Offshore Oil Corporation Limited reported an eastern South China Sea discovery in late March, its Huizhou 19-6. A Paleogene light crude find, the well encountered 127 meters of oil and gas pay zones, CNOOC noted. It estimated the field holds more than 100 million tons of oil equivalent in place, more than 700 million boe.

OPEC+ announced an accelerated phase-out of its voluntary oil production cuts, with eight members agreeing to a total increase of 411,000 barrels per day. The cartel followed up in July with a production increase adjustment of 548,000 b/d. OPEC earlier had reported plans for a "gradual and flexible" lifting of its total 2.2 million barrels per day in production curtailments.

Saudi Arabia and Kuwait announced a Neutral Zone oil discovery in the North Wafra Wara-Burgan field in May. The discovery well reportedly flowed at more than 500 barrels per day, with API gravity of 26-27 degrees.

"This marks the first discovery since the resumption of production operations in the Partitioned Zone and its adjacent offshore area in mid-2020. The discovery is regarded as highly significant," the announcement stated.

Prices, Supply

Brent crude reached its mid-year price low, around $60 a barrel, in early May. Global oil prices then recovered but declined again after July, with Brent once again trading in the $60 to $65-per-barrel range late in the year. West Texas Intermediate crude was priced below $60 a barrel by year-end.

Throughout 2025, average U.S. natural gas prices stayed meaningfully higher than a year earlier. The Henry Hub spot price rose to more than $4 per million Btu in January, falling below $2.90/mmBtu only in the low-demand summer months, according to the U.S. Energy Information Administration. U.S. gas futures hit $5-plus at their high in December.

Volatility marked world LNG prices, which spiked early but then declined to about $11/mmBtu for major overseas benchmarks in the 4th quarter of 2025, while US LNG export prices fluctuated around $7-$8/mmBtu.

Global oil supply saw a significant increase of almost 1 million barrels per day, rising to reach 105.6 million b/d in June. Crude inventories surged and supplies of natural gas liquids and feedstocks were up for the fourth month in a row.

Fitch Ratings service changed its 2025 outlook for the global oil and gas sector in June from "neutral" to "deteriorating." It cited U.S. tariff announcements, faster than expected easing of OPEC+ production limits and growing non-OPEC production.

On June 22, the U.S. Air Force and Navy conducted a bombing run against three Iranian nuclear facilities – Natanz, Fordow and Isfahan. World oil prices increased but quickly fell back.

Other Major Discoveries

Explorers reported several notable discoveries around the world in July and August:

- Central European Petroleum announced results of its Baltic Sea offshore Wolin East well in Poland, coming in at about 200 million boe – 22 million metric tons of oil and 5 billion cubic meters of natural gas. CEP called it "the largest conventional oil discovery in Poland's history and one of the largest in Europe."
- Azule Energy, a BP-Eni partnership, reported that its offshore Gajajeira-01 well drilled in the lower Congo Basin of Angola produced gas and condensate in a Lower Oligocene target. Initial assessments "suggest that gas volumes on site may exceed 1 trillion cubic feet, with up to 100 million barrels of associated condensate," Azule noted.
- Aker BP completed its Omega Alfa exploration campaign in the Norwegian North Sea with an oil discovery in the Yggdrasil production area. It estimated recoverable volumes at 96 million-134 million boe, increasing total Yggdrasil reserves to 700 million-800 million boe.
- Talos Energy announced successful results from its Daenerys deepwater exploration project on several Walker Ridge blocks in the Gulf of Mexico (America). The discovery well found oil pay in multiple high-quality, subsalt Miocene sands, Talos reported.
- BP labeled its successful well on the offshore Bumerangue block in Brazil's Santos Basin the company's largest discovery in 25 years The well penetrated an estimated 500-meter gross hydrocarbon

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column in a pre-salt carbonate reservoir, BP reported.

Other Highlights and Low Points

Dry Hole of the Year probably went to the Argerich-1 well drilled by Equinor on the CAN-100 block off Argentina, declared a duster in July. The Argentina Norte Basin project, about 300 kilometers offshore, was an attempt to step production south from Brazilian waters.

In September, Oil India's discovery of natural gas with the Vijayapuram-2 well in the Andaman Basin, near the Andaman Islands, caused considerable excitement and speculation in India's media. The Andaman-Nicobar basin area and India's Mahanadi and Bengal basins are all now considered prospective for oil and/or gas.

Iran reported the major natural gas find of the year with an estimated 10 Tcf gas-in-place discovery in the Pazan field in the country's south. Pazan also could hold more than 200 million barrels of oil, Iran noted. And Kuwait Oil Company claimed another gas and condensate find, this time in the offshore Al Jazah field. KOC estimated potential gas reserves of 1 Tcf or more.

In a global first, for the first half of 2025, renewable energy sources produced more electricity worldwide than natural gas, according to a report issued in October by energy think tank Ember. Renewables generated 34.3 percent of electricity and coal 33.1 percent, it found, as comparatively low cost boosted wind and solar usage.

Wood Mackenzie found that several countries achieved record oil production in 2025, reshaping the world's supply balance:

- United States: 13.7 million b/d in August
- Canada: 5.11 million b/d in July
- China: 4.6 million b/d in April
- Brazil: 3.96 million b/d in July
- Kazakhstan: 2.17 million b/d in March

"For the first three quarters of this year, the (oil) market was in surplus about 2 million barrels a day. Over this period, we did see global inventories increasing by about 300 million barrels," observed Toril Bosoni, head of markets for the International Energy Agency.

She attributed the surplus and inventory expansion to record exports from the Middle East and the United States, stock building in Chinese inventories, increases in gas liquids holdings and a surge in crude held in ocean transport.

Mergers and Acquisitions

In a third-quarter survey by the Federal Reserve Bank of Dallas, 36 percent of energy executives reported they had significantly delayed investment decisions in response to uncertainty about the future price of oil and/or the cost of producing oil.

The pace of mergers and acquisitions in the energy industry slowed in 2025, but big deals continued to emerge. The year started with power producer Constellation announcing it would acquire gas producer Calpine Corp. in a cash and stock transaction valued at approximately $16.4 billion.

Other mergers and acquisitions activity included:

- Diamondback Energy acquired subsidiaries of Double Eagle IV in a deal valued at $4.08 billion, including $3 billion in cash. According to analysts, Diamondback gained core Midland Basin assets with more than 340 net horizontal well locations on 40,000 net acres of

largely undeveloped acreage.

- Diversified Energy acquired Maverick Natural Resources, a private equity-owned company, for about $1.3 billion. It got entrée to the Permian Basin with Maverick's producing oil fields in West Texas and New Mexico.
- SM Energy Company and Civitas Resources announced a merger agreement in a $12.8 billion combination. SM Energy was set to emerge as one of the Top 10 U.S. independents with about 823,000 net acres in the Permian Basin, DJ Basin and other plays.
- In a multi-stage deal, Antero Resources agreed to acquire the upstream assets of HG Energy for $2.8 billion in cash plus assumption of HG's hedge portfolio. Antero Midstream would purchase HG's complimentary midstream assets for $1.1 billion, while Antero would divest upstream and midstream Utica Shale assets for $1.2 billion.
- Canadian firm Ovintiv agreed to acquire all the outstanding shares of NuVista Energy in a cash and stock transaction totaling about C$3.80 billion (US $2.77 billion). The deal includes around 140,000 net acres (about 70-percent undeveloped) and 930 well locations in the core of the Alberta Montney shale play.

Midstream activity included a December announcement by Targa Resources that a subsidiary would acquire Stakeholder Midstream LLC for $1.25 billion in cash. Stakeholder provides natural gas gathering, treating and processing services in the Permian Basin.

In LNG and energy infrastructure, Sempra arranged to sell a 45 percent equity interest in Sempra Infrastructure Partners to affiliates of KKR, a leading global investment firm. Transaction proceeds were $10 billion, subject to adjustment.

Subsea contractors Saipem and Subsea 7 agreed to combine into a new entity, Saipem7, in a major energy services merger. Petrobras, ExxonMobil and other entities challenged the plan, citing concerns about its effect on competition in the subsea sector.

Late-Year Developments

In November, Chevron reported that West Texas would be the site for its first natural gas power plant to support AI data center needs. ExxonMobil also planned to equip data centers with natural gas plants, as the energy industry attempted to cash in on the AI-related building boom.

Eni announced a late-year gas discovery with its Konta-1 well in the Kutei Basin, some 50 kilometers off the coast of East Kalimantan in Indonesia. It estimated 600 billion cubic feet of gas in place plus condensate, with total potential of more than 1 Tcf.

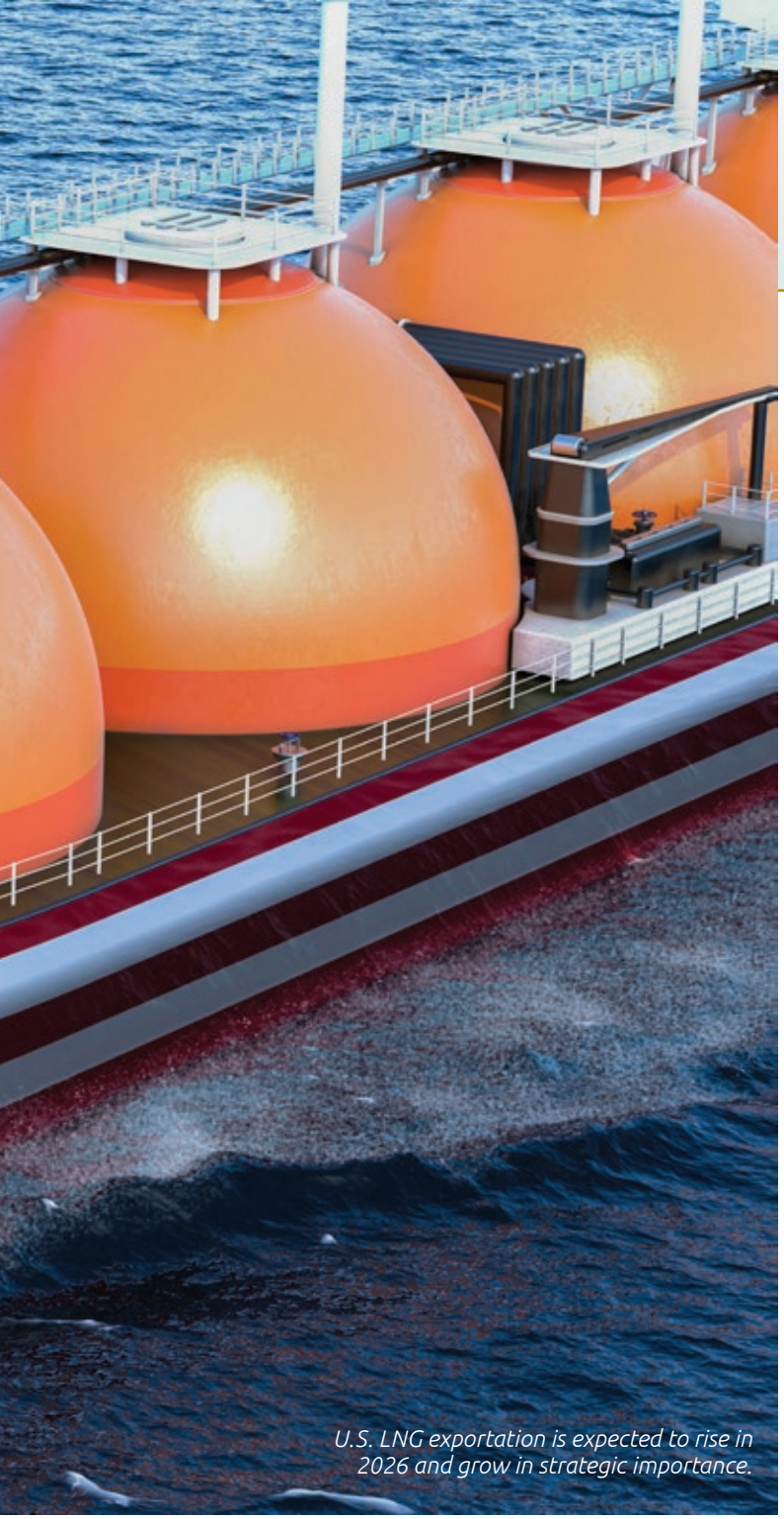
In December, Australia opened up five exploration areas in the Otway Basin for permit bidding, two offshore Victoria and three offshore Tasmania. The government hopes to encourage natural gas exploration and development. Bidding closes at the end of June. ConocoPhillips had already started exploratory drilling in the basin.

Energy geopolitics again took prominence as the year drew to a close, when U.S. forces seized control of an oil tanker offshore Venezuela. The Trump administration claimed the tanker was loaded with sanctioned crude. It placed additional sanctions on six other vessels carrying Venezuelan oil. Trump later announced a blockade on all sanctioned tankers entering or leaving Venezuelan waters.

The Year of AI, Continued

Oil and gas companies face a year of price weakness, selective growth and technological transformation.

By DAVID BROWN, EXPLORER Correspondent



U.S. LNG exportation is expected to rise in 2026 and grow in strategic importance.

"New tech, new skills – workforce transformation isn't optional."

- Growth priorities
- Cost pressures
- Scaling U.S. LNG
- Digital transformation
- Rebuilding downstream

Uncertainty over U.S. tariffs and increased costs are both having a significant impact, said Zillah Austin, vice chair, U.S. energy and chemicals leader for Deloitte Consulting LLP.

"We're starting to see changing trade rules alter investment timelines. Another major area is cost," Austin noted.

"We're seeing that materials and services (costs) could rise 4 to 40 percent in some parts of the oil and gas sector. The overall cost impact depends on kind of project, project location, timeline and other factors," she said.

Deloitte does expect moderate overall growth for the industry, but its analysis projects that only 15 to 25 percent of listed U.S. oil and gas companies will be able to achieve revenue growth above 5 percent. Natural gas and U.S. LNG are the strongest areas.

"U.S. natural gas and liquefied natural gas companies will likely boost their capital expenditure and expand their shale acreage, driven by rising data center demand and supportive LNG export policies," Deloitte's outlook predicted.

"But U.S. oil companies could remain cautious, awaiting a structural change in global demand-supply fundamentals, before boosting investments," it observed.

Austin said keywords for oil and gas this year are "resilience" and "agility." As energy companies respond to challenges, they are "compressing the time from signal to decision," she noted.

"They're figuring out how to do quick pivots in a short time period," Austin said.

Her third keyword is "discipline."

"We're seeing a lot of capital discipline. Cash discipline is a main priority. Many (companies) are continuing to do a lot more with less," Austin said. "Companies are trying to figure out how to get their costs down, and they're using generative AI and real-time analytics to increase operational efficiency."

Price Decline

Whatever started last year looks likely to continue for the energy industry in 2026. Forecasts call for a continued decline in oil prices, limited growth, rising costs, additional asset sales, and more industry restructuring.

In the view of most analysts, the year will shape up to be a challenging 12 months for oil and gas.

Consulting and financial firm Deloitte highlighted five key industry trends in its 2026 Oil and Gas Industry Outlook:

In its Short Term Energy Outlook, the U.S. Energy Information Administration forecast lower 2026 oil prices, with the decline somewhat moderated by China's continuing oil inventory build-up and OPEC's ongoing production curtailment.

"We expect global oil inventories to continue to rise through 2026, putting downward pressure on oil prices in the coming

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months. We forecast the Brent crude oil price will fall to an average of $55 per barrel in the first quarter of 2026 and remain near that price" for the rest of the year, the EIA reported.

In the United States, it predicted that "milder-than-normal weather in early 2026 and rising production will help moderate natural gas prices following the winter, with the Henry Hub price averaging about $4.00/MMBtu (million Btu)" for the year.

JPMorgan, Goldman Sachs and Bank of America forecast similar 2026 oil prices, with Brent slightly above $55/barrel. Analysts agreed that a supply surplus carryover will continue to depress market prices. Rystad Energy predicted a surplus of as much as 3.75 million barrels per day of liquids.

"A supply overhang could outpace demand in 2026, putting extra pressure on prices – and tightening margins across the board," said Austin.

U.S. LNG's Growing Supply, Strategic Importance

U.S. exports of LNG jumped significantly last year. The EIA predicts another large increase this year, to an average 16.3 billion cubic feet/day. Analysts expect firm world LNG prices with a possible dip later in 2026, as the market absorbs the supply increase.

"LNG is gaining strategic importance for meeting the rising global energy demand from data centers and big industrial projects. Global LNG demand is projected to rise by 60 percent between 2024 and 2040," Austin noted.

"With the U.S. fast-tracking LNG export approvals and permitting, LNG is increasingly central to U.S. energy strategy and trade balance," she said. "U.S. LNG exports could potentially double by 2030 if all approved projects proceed."

Mergers and Acquisitions Won't Slow Down

Large mergers and asset sales continued in the industry throughout last year, and Deloitte expected the trend to keep going in 2026. Its outlook included "accelerated internal restructuring," noting that "policy changes could incentivize buyers and sellers, revitalizing asset-level mergers and acquisitions."

"Facing price and cost pressures, nearly 70 percent of the U.S. oil and gas companies analyzed plans to restructure portfolios, optimize costs and divest noncore assets," Deloitte reported.

Several deals were in progress in late 2025 and even more potential sales were rumored. Those included a sale or transfer of Lukoil's foreign assets, in response to sanctions on Russia and pressure from the U.S. Treasury Department. Shell was tied to acquisition of Gulf operator LLOG Exploration Offshore. Additional asset sales were under consideration in the Permian Basin, and analysts predicted increased M&A activity in the African energy sector.

"In a more interesting way, we are seeing M&A activity already happening," Austin said.

This M&A cycle "will see both caution and boldness – some will pursue tech-smart, disciplined deals, as others seize growth" from digital and physical infrastructure investments, she added.


Zillah Austin

The Year(s) of AI

If 2025 was the Year of AI, 2026 looks like the Year of AI, Part 2. Deloitte reported that about half of energy AI spending targets process optimization, with much of the rest going to integrating operations and improving asset performance.

"Digitally enabled operations are becoming the next frontier for competitiveness," Deloitte reported.

Austin noted that AI-related expenditures currently make up less than 20 percent of total IT spending by U.S. oil and gas companies, but are projected to reach more than 50 percent by 2029.

"Rising costs and slowing productivity gains will drive companies to accelerate AI-powered operations and digital transformation," she said, adding that "generative AI, agentic AI and real-time analytics will likely be integrated and implemented at scale in 2026 and beyond."

Everyone working in the energy industry will be affected by the technology transition and the growing implementation of AI tools, analysts agree. It's now a familiar refrain: Employees can expect more reskilling and upskilling, acquiring enhanced skills to deal with advancing technology.

"New tech, new skills – workforce transformation isn't optional," Austin said.

"Upskilling fuels resilience in an age of constant disruption," she observed. "Our research shows that 60 percent of people working in oil and gas may require some kind of upskilling."

Asked what people in the oil and gas industry will find most surprising about 2026, Austin predicted it will be the incredible pace of change.

"The rate of constant change is higher and faster than it has ever been. In today's energy landscape, unpredictability isn't a disruptor – it's the baseline," she said.

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Brazil's Energy Outlook After COP30

How global climate negotiations intersect with local market realities

By EMILY SMITH LLINAS, EXPLORER Correspondent

In November, 60,0000 people converged on Belém, Brazil for the 30th session of the United Nations Conference of the Parties, or COP 30, as it is better known: the annual climate summit where nearly 200 countries meet to negotiate and agree on actions to combat climate change.

The event turned global attention to how the Brazil's energy system could reconcile climate ambition, economic growth, and energy security.

Belém, a city of 1 million people located in the heart of the Amazon, was a significant and symbolic choice for the world's most biodiverse country and largest economy in Latin America.

Brazil brings a unique set of structural characteristics to the global climate debate: With

Aerial view of deforestation of a road being built in the Amazon rainforest for the UN Climate Change Conference Cop 30 in Belém, Pará, Brazil. Photo licensed from Shutterstock.

an annual gross domestic product of (U.S.) $2.2 trillion, Brazil is one of few economic giants whose energy mix already includes more than 25 percent renewable sources.

The country also has a conspicuously different carbon footprint than other emerging economies. In 2023, fossil fuels represented approximately 20 percent of overall emissions, while land use and forestry account for 40 percent of emissions, and agriculture 30 percent, according to Rystad Energy analysis.

Brazil also has a rapidly growing services sector and is a global leader in mining, agriculture, manufacturing, and forestry. The sectors frequently took center stage during complex and contested discussions at COP30.

Experiencing COP

Renata Jaffar, senior vice president of business development in Latin America for Rystad Energy, attended the event in Belém.

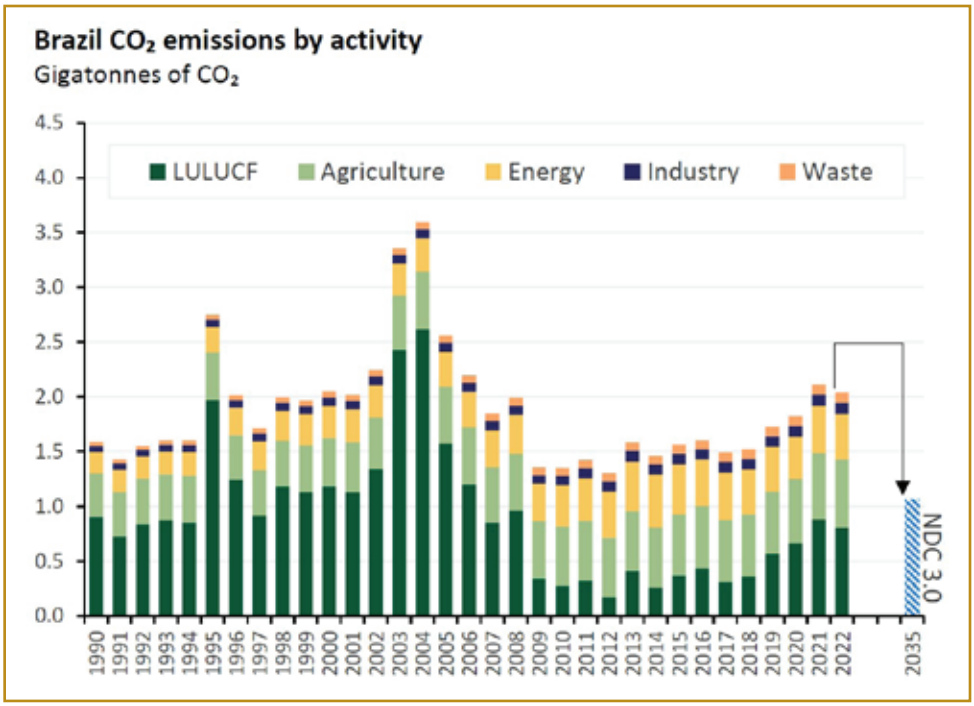
She described the atmosphere as "intense, highly engaged and pragmatic."

"What stood out to me was how democratic the discussions felt, a wide range of voices were present and heard, from indigenous communities to countries articulating their priorities in very distinct ways, yet all contributing toward a collective objective. Being in that environment was powerful; there is something almost magnetic about the energy of a place where so many perspectives converge around shared global challenges," she said.

Attending COP was a great way for Jaffar to finish her first year with Rystad Energy, a Norway-based energy research and business intelligence company that provides data, analysis and insights to help clients navigate the global energy system and make investment decisions. The experience also reinforced the importance of connecting global climate discussions with rigorous, system-level energy analysis.

Jaffar works with clients in Latin America and values the strategic nature of her role.

"I'm constantly connecting macro trends with very practical business decisions, whether that's supporting an operator's investment strategy, a bank's risk assessment, or a government's long-term planning."



Brazil has committed to reducing its emissions by 59 percent to 67 percent from 2005 levels by 2035, a decrease of 1.5 to 1.7 gigatonnes. Source: Rystad Energy Research and Analysis, Brazil's Energy Horizon – COP 30 Special Report, November 2024

Brazil's Energy Horizon

Jaffar shared Rystad Energy's November 2025 publication, Brazil's Energy Horizon, Leading Low carbon growth, while empowering energy security, a special report prepared ahead of COP30, with AAPG to support the broader discussion around Brazil's energy outlook.

This report takes a view of Brazil's energy trajectory up to the year 2040 and asks how far the country can push decarbonization while expanding its economy, meeting rising energy demand and making use of its natural resource base.

Key report findings include:

- Brazil's demand outpaces global growth: While the pace of global energy demand is set to slow as efficiency

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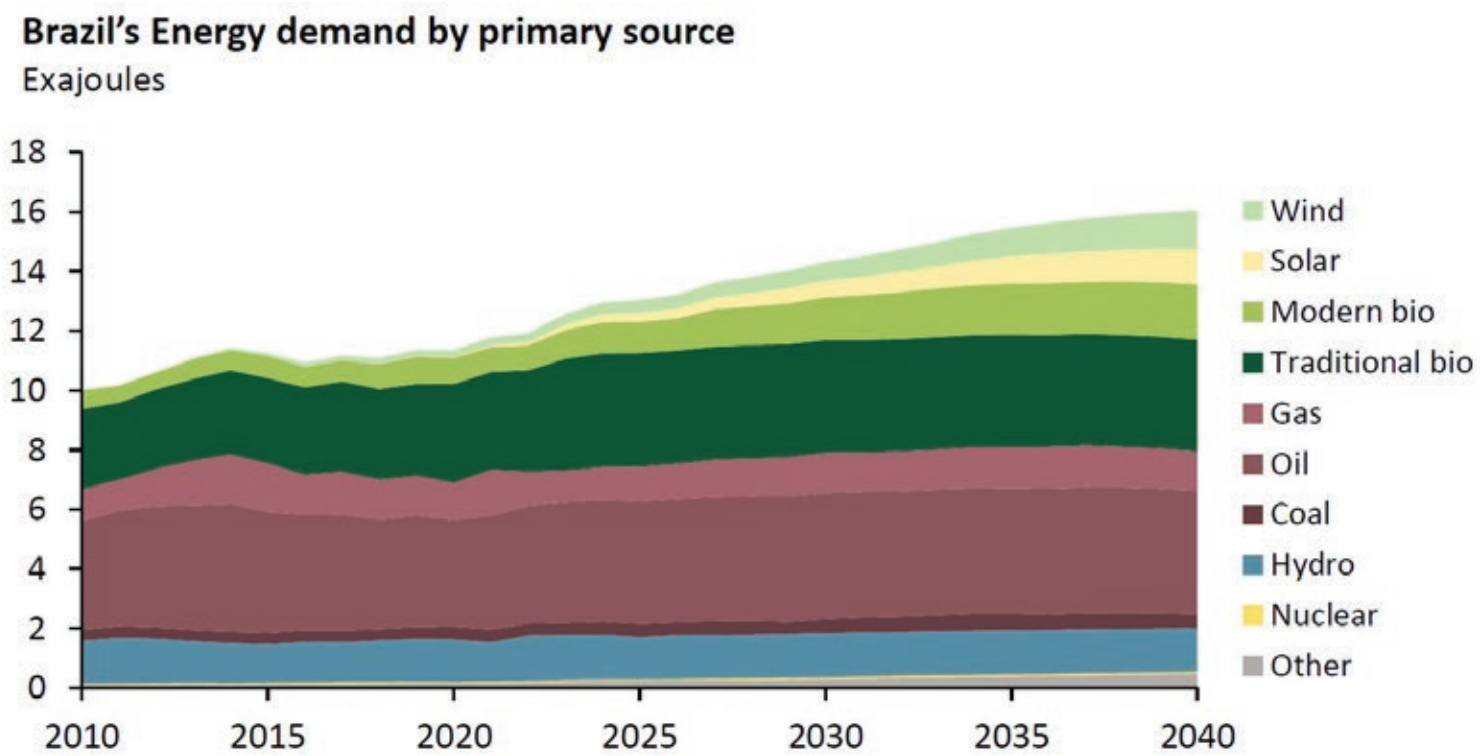
UK Prime Minister Keir Starmer at COP30 in November. Photo licensed by Shutterstock.



Rystad Energy Research and Analysis, Brazil's Energy Horizon – COP 30 Special Report, November 2024

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improves and economies shift toward less energy-intensive activities, Brazil follows a different trajectory. The report concludes that, by 2040, Brazil will have a 25-percent increase in primary energy demand, driven by a growing population, higher income per capita and industrial expansion.

- Renewables drive supply expansion: Last year, approximately 25 percent of Brazil's primary energy came from renewables, and the share is expected to rise to 36 percent by 2040. Roughly 80 percent of the additional primary energy needed to meet demand growth up to 2040 comes from renewable sources, with hydropower as the backbone and solar and wind showing the largest gains.
- Brazil's energy emissions form a small share of overall emissions: Brazil's emissions profile sets it apart from most large emitters. In 2023, total emissions were about 2.0 gigatons, yet only around 21 percent came from energy. Nearly 40 percent stemmed from land use, landuse change and forestry, and about 31 percent from agriculture.
- Climate regulation framework taking shape: Since 2023, Brazil's regulatory landscape has moved quickly to anchor its decarbonization trajectory. New laws and regulations are institutionalizing frameworks for biofuels, carbon capture and storage, low-carbon hydrogen, electric mobility and, most notably, a regulated carbon market.
- Oil and gas take a backup role in transition: Unlike other countries, oil and gas play a supporting rather than leading role in Brazil's energy transition. Oil demand rises from 2.6 million to about 2.7 million barrels per day in the early 2030s and then holds roughly flat to 2040, while total liquids, including biofuels, grow more strongly as ethanol and biodiesel displace part of the fossil pool. Natural gas demand remains modest by international standards, with upside in power, fertilizers, and industrial fuel switching if prices become more competitive.

Beyond the Data

Jaffar said her experience at Rystad Energy has reinforced that data alone is not enough to predict the future.

"Context is everything. The same dataset can lead to different conclusions depending on regulation, infrastructure, financing conditions and political dynamics. Another important learning is how critical long-term partnerships are in this region. Trust and continuity really matter in Latin America. In an era increasingly shaped by AI, maintaining active, human relationships with the market has become one of the greatest differentiators and something technology can enhance, but never fully replace," she said.

Attending events like COP creates opportunities to align global intelligence with local realities.

"A COP is where global priorities are discussed, negotiated and eventually translated into decisions that shape regulation, capital allocation and long-term strategy," she said.

"As someone in a market intelligence business, being there felt essential, not only to closely follow how these decisions are made, but also to stay connected to the policymakers, companies and institutions we support in their strategic thinking."

Jaffar noted that COP30 was particularly meaningful because it was held in Belém.

"Bringing the event to the Amazon placed the energy addition debate much closer to the realities of emerging economies and resource-rich regions, reinforcing how important it is to balance climate ambition with development, energy security and social impact," she said.

COP Results

After two weeks of intense negotiations, the 195 parties approved the Belém Package. The 29 decisions adopted by consensus include agreements on just transition, adaptation finance, trade, gender and technology, renewing the collective commitment to accelerated action and to a climate regime more closely connected to people's lives.

The package called for mobilizing funds for climate action and launched two major initiatives: the Global Implementation Accelerator and the Belém Mission to 1.5-degrees Celsius, to "help countries deliver on" their nationally determined contributions (NDCs), or national climate action plans, and adaptation plans.

The final text did not include an explicit reference to phasing out fossil fuels – an initiative supported by more than 80 countries, instead maintaining the COP28 language calling for "transitioning away from fossil fuels."

A total of 119 countries submitted updated NDCs, outlining commitments to reduce greenhouse gas emissions and adapt to climate change impacts.

Collectively, however, these commitments still place the world on a modeled trajectory

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AAPG Energy Opportunities Conference

Companies interested in Brazil's oil and gas and renewable energy sectors can learn more at AAPG's Energy Opportunities Conference, hosted by Petrobras at the Hilton Rio de Janeiro in Copacabana from April 28-30.

Energy Opportunities is an executive-level event designed to connect decisionmakers working in the exploration, as well as on energy transition and sustainable development initiatives. With previous editions taking place in Colombia, Mexico, Uruguay and online, Energy Opportunities comes to Brazil for the first time in 2026.

Themed "Generating Value through Energy Addition," the conference covers the following topics:

- Expanding Success Across the Equatorial Margins
- Unlocking the Strategic Value of the South Atlantic Margin
- The Role of Natural Gas in the Energy Trilemma
- A Solid Portfolio: Balancing Oil and Gas and Renewables to Mitigate Risk and Maximize Returns
- The Path to Net Zero: Best Practices for Decarbonizing Oil and Gas Operations
- CCUS Project Implementation: Regulatory Frameworks, Infrastructure Investment, and the Leap from Pilot to Profit
- From Concept to Viability: Translating O&G Expertise into Geothermal and Hydrogen Projects
- Staying Connected: Meeting Energy Demand to Data Centers and AI

Jaffar said she is excited to be a part of the Energy Opportunities Committee for the first time.

"Energy Opportunities is a forum that truly brings together geology, energy strategy and investment decisions," she said. "I joined the program committee because I believe I can meaningfully contribute to these highly relevant discussions, whether by bringing research and insights to the table, connecting the right people, or helping coordinate the many variables required to make the event both substantive and successful. Being part of this process allows me to support conversations that are technically solid, forward-looking and genuinely useful for decision-makers. It's a happy place to be!"

Jaffar said she expects Energy Opportunities will deliver honest, high-level and practical discussions.

"The program goes beyond theory by bringing together a diverse set of players to openly discuss challenges, trade-offs and real opportunities, from exploration and development to decarbonization, gas, CCUS and new energy solutions," she said.

"I also expect strong interaction across regions and disciplines, which is essential at a time when the energy system is becoming, more than ever before, interconnected."

Jaffar encouraged colleagues to attend the event.

"Energy Opportunities is not just another conference. It's a platform for dialogue and connection. Attendees have the chance to engage directly with decision-makers, access high-quality technical and strategic content, and participate in conversations that genuinely influence investment and policy thinking. The mix of panels, B2B meetings and side discussions creates an environment where ideas move quickly from insight to action," she said.

Regional Opportunities

Despite its location in Brazil, the Energy Opportunities Conference has a regional focus, and both speakers and attendees come from throughout the Americas, Europe and Asia.

Jaffar looks forward to sessions highlighting some of the region's other major players.

"Beyond Brazil, Argentina and Colombia remain very relevant, each for different reasons. Argentina stands out for its resource base, particularly in gas, while Colombia continues to play an important role in regional energy security and transition discussions. Guyana and Suriname also deserve attention due to their offshore potential, albeit at an earlier stage of maturity."

The location and the subject matter make the conference a must-attend for decisionmakers working in today's energy sector.

"Latin America, and Brazil in particular, will play a central role in meeting global energy demand over the coming decades," she said.

"Events like this are essential because they allow us to address complexity with nuance, bringing different perspectives into the same room. Progress will come from collaboration, pragmatism and a clear understanding that the future energy system will rely on multiple sources working together."

To learn more about the AAPG Energy Opportunities Conference visit https://energyopportunities.info

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Renata Jaffar moderating a panel at OTC Brasil in Rio in October 2025

of 2.3 to 2.8-degrees Celsius, of warming, well above the 1.5-degree target.

Following the event in Belem, Rystad published COP 30: Progress, gaps and the road ahead to COP 31.

The report summarizes key outcomes from the conference, including the updated NDCs and what they imply for global emissions, the gaps between current commitments and a 1.5-degrees Celsius pathway. The Rystad report also highlights the political tensions that shaped the final package, such as the exclusion of the fossil-fuel transition roadmap and critical minerals and discusses what these decisions mean for COP31 to be hosted by Türkey, with negotiations led by Australia, in 2026.

The Way Forward for Brazil

Jaffar said her experience at COP30 led her to several conclusions.

"My main takeaway is that the transition will not be linear or uniform or easy," she said.

"Countries will move at different speeds and along different paths. Companies that understand local realities and design flexible strategies will be far better positioned than those applying one-size-fits-all approaches."

Flexible strategies are particularly important for companies operating in countries like Brazil, whose energy sector Jaffar describes as "complex, but promising."

"Brazil combines scale and diversity like no other country in the region," she said.

"It has a large domestic market, sophisticated operators, deep capital markets and a relatively diversified energy mix. This allows Brazil to test, absorb and scale solutions faster than many of its neighbors," she said.

Along with the opportunities come challenges, most of which Jaffar attributes to coordination and execution.

"We have strong resources, a diversified energy mix and solid technical expertise, but regulatory uncertainty, infrastructure bottlenecks and lengthy permitting processes can slow progress," she said.

"Brazil has all the resources and capabilities to be one of the most diversified and resourceful energy countries in the world, yet at times we create obstacles to our own development due to a lack of coordination across institutions and stakeholders," said Jaffar.

Alongside this complexity lie significant opportunities.

"Brazil stands out in offshore oil and gas, bioenergy, gas-to-power, and increasingly in the energy transition space, including hydrogen, carbon management and renewable integration. At the same time, it is important to recognize that there are still substantial energy resources to be developed, which can and should be explored with sustainability, responsibility and strong governance at the core," she said. "There is also a major opportunity in improving market design and overall efficiency."

Advice for Potential Investors

Jaffar has plenty of advice for companies interested in working in Brazil.

"Companies should understand that Brazil rewards long-term thinking," she said. "It's not a short-term or purely transactional market. Regulatory knowledge, local partnerships and patience are key. While Brazil has its own idiosyncrasies, it is a relatively stable environment for investors, with a strong track record of honoring contracts and commitments, which ultimately enhances predictability for those willing to engage with the market in a consistent and informed way."

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A Gulf Coast Gas Crunch is Imminent

LNG exports, declining supply and data center demand point to a major shortfall by 2028

By BARRY FRIEDMAN, EXPLORER Correspondent


William DeMis

You want the bottom line when it comes to natural gas on the Gulf Coast?

"We have not been finding enough new fields."

That's William DeMis, president of Richelle Court, LLC, who said that, in addition to not finding enough, we keep erecting new ways to export what we're not finding.

"We continue to expand (liquefied natural gas) export facilities. My thesis is that to understand the natural gas market in America, you don't have to understand every molecule of natural gas in every LNG tanker around the planet," he said.

You just have to look to the bayou.

"Look at Southwest Louisiana and the net flows of natural gas into and out of Southwest Louisiana to know where natural gas prices will be going," said DeMis.

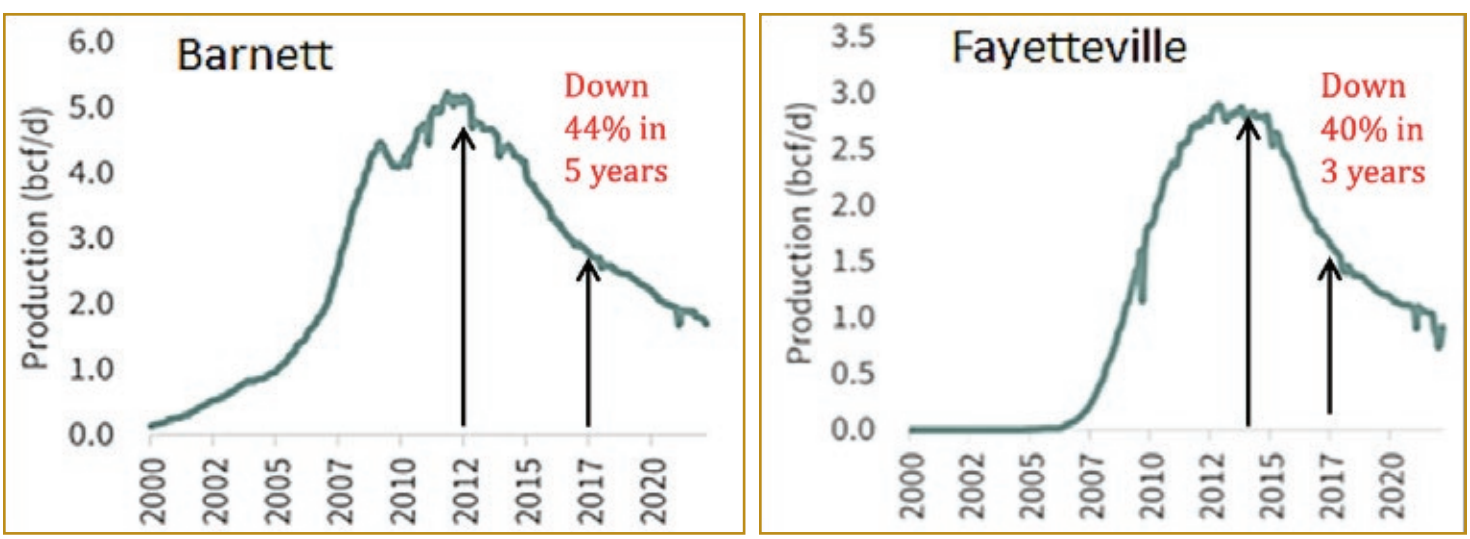
And he believes that will translate to a 10-billion-cubic-feet-per-day shortfall by 2028.

"To put that number in perspective, that is two-thirds of the production reported by the EIA for the Haynesville region," he said.

The reason Southwest Louisiana is important, he explained, is because that is where essentially all of the LNG export facilities are located (and will be located), and it's where many of the petrochemical plants are as well.

There are three gas pipelines coming in from the Permian that will be bringing 7 Bcf per day of Permian gas into the Gulf Coast.

"It all comes down to a little bit of simple math: What are the inflows into the Gulf Coast from sources like the Permian or the big Haynesville field by 2028? And how much gas will be going out in the form of LNG by 2028?"



Production curves for the Barnett and Fayetteville Shale Plays. Gas production declined rapidly after a 3- to 4-year plateau. These fields might be instructive in predicting of Haynesville decline. (from DeMis, 2025)

A Frenzy of New Demand

Haynesville field is in decline now, though, and operators have learned their lesson to not overdraw the field and thereby crash the price of natural gas.

"But the gas will be needed, especially with the added demand coming from all those data centers. My math shows that if ERCOT (Electric Reliability Council of Texas) approves the data centers connections submitted just this year – about 100 gigawatts – then there will be an additional demand of 13.6 BCFG per day," he said.

DeMis said he feels this current frenzy in utilities connection applications will force ERCOT to do what PJM Interconnection, the Mid-Atlantic region's utility transmission organization, did in 2022: put a moratorium on connection applications.

"PJM got slammed with 1,200 connection requests, primarily from solar projects. Fast forward to today, news services are reporting that PJM might not allow data centers to be connected until they secure power generation and transmission lines," noted DeMis.

But we have seen this movie before: back in 2022, utilities had had enough with all the wind and solar applications and just said, "No more!"

"It was not that the projects were bad or wrong, it was just that the utility companies could not digest the sheer number of applications. The number of data centers, and the amount of power each DC uses, is not sustainable," he explained.

DeMis also remarked that, to some extent, the number of applications "reflects a bit of gamesmanship on the part of Big Data, where everyone wants to get in an application before utilities do like PJM did in 2022 and closed the door to all applications."

PJM is possibly moving to require data centers to come with power already built before they get a connection permit.

"Seems fair to me" said DeMis.

The way, he said, to avert the coming shortage is for people to find new sources of gas outside of Haynesville field, which for years, considering its proximity to the Gulf Coast, and the petrochemical plants of Southwest Louisiana, as well as pipelines, made it a swing producer for natural gas.

"But I can tell you from bitter experience over the last three years that finding people to fund greenfield exploration is darn near impossible. There is scant capital to drill natural gas wildcats in the U.S." said DeMis.

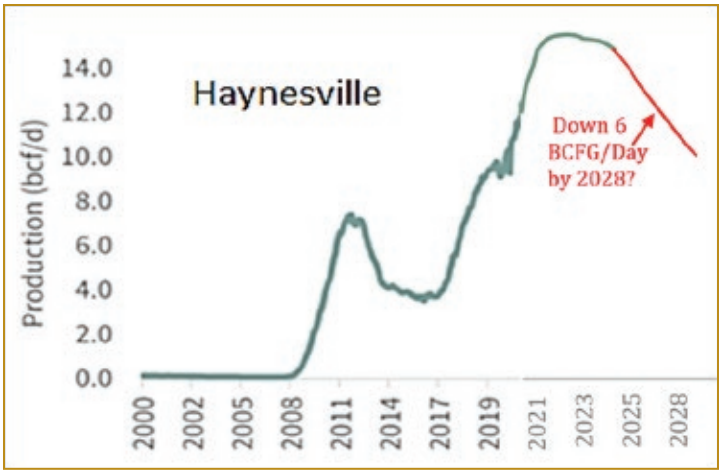
The other factor is the natural decline in gas plays like the Barnett and Fayetteville, both of which grew to a plateau that held quasi-stable for three to five years before declining. Operators are realizing there is no economic incentive to stand up rigs when natural gas prices are below 3.50 or $5 per thousand cubic feet.

What frustrates him, DeMis said, is that there is money for AI computing centers and even money for power centers.

"I asked the last good folks pitching a (private equity) investment for a power generation project, 'Just exactly where are they are going to get the gas to power this monster?' They did not like the question. And they did not have an answer," he said.

It is going to be, he fears, a serious problem.

"A shortfall of 10 BCF a day is 10 to 12.5 percent of U.S. gas production, depending on if you count just dry gas, or dry gas-plus-associated gas and plant extracts. But any way you cut it, 10 BCFG per day is a lot," explained DeMis.



Possible Haynesville field production by 2028 (from DeMis, 2025)

Putting the Pieces Together

There are five pieces to the puzzle right now:

- Both Barnett and Fayetteville fell by 40 percent of their top plateau in three to five years. If the Haynesville falls like the Barnett and the Fayetteville, a decline of 6 billion cubic feet of gas per day can be expected.
- Operators in Haynesville now have HBP'd ("held by production") all of their acreage. There is no incentive for operators to, as DeMis said, "drill, baby, drill" to hold their leases.
- By mid-2024, methane prices were below $2, thereby making methane – on an inflation-adjusted basis – "the cheapest source of energy literally since the time of the Egyptian pharaohs. On a BTU basis, at $2, methane was cheaper than running oats through your oxen," said DeMis. "This is never going to happen again."
- Massive operator consolidation in Haynesville: "There are only a dozen operators left in the Haynesville field. What this means is that the few operators left in the field have been buying out their competition and paying a dear price for their 'sticks on the map' (meaning their proven locations). These operators can count their 'sticks' and see that their remaining 'sticks' are precious, so they will be reluctant to drill up their inventory without higher prices" he said.
- As mentioned, LNG capacity will expand "on a monster scale," he added. "The latest number I saw was that we should see LNG capacity increase by about another 11 BCF of gas per day by 2028." The United States is now the world's largest exporter of LNG. "We have gone from less than 3 BCF of gas per day in 2018 to almost 14 BCF per day in LNG exports today, according to the EIA."

"So if the operators are going to be reluctant to drill until prices are high, yet at the same time, politicians, pundits, LNG exporters and data centers want more gas, then obviously prices are going to go higher," he added.

DeMis, who will be speaking on the situation in Haynesville at AAPG's "Subsurface Energy to Power" event in Houston this month, said his message will be to explain why there will be a natural gas shortage in the Gulf Coast in three years just as data centers are ramping up power demand.

The Man Who Saw Beneath the Salt

Guilherme Estrella, AAPG Harrison Schmitt Award winner

By BARRY FRIEDMAN, EXPLORER Correspondent

For as long as there has been oil in the ground, the relationship between geologists and politicians – the arguments, and the turf battles, especially when occurring in Brazil – has been part of the life of this year's AAPG's Harrison Schmitt Award winner, Guilherme Estrella.

The award, by design, was never intended to fit neatly into any specific category, but is presented by the Association as a lifetime achievement award.

In Estrella's case, that is as it should be.

Estrella just turned 84. His longevity, he said – even what he calls his "survival" – within the history of Brazilian petroleum comes from his successful participation with a generation of

Majnoon, Iraq in 1977: Estrella is on the far right.

Estrella (left) with the general manager of Petrobas America at the 1992 Offshore Technology Conference

industry and academic professionals.

But what an 84 years it has been.

'Craziness' in Iraq

After graduating school and working in the oil business in Rio de Janeiro, the nation's capital, he made a decision that would change his life.

"In 1976, I arrived in Baghdad with my wife and our four children and took on the role of exploration manager for Petrobras-Iraq," he said.

Up until that point, Brazil was importing 80 percent of the oil it needed, most of which came from Iraq.

"And here I am," he said of his time in Iraq, "as a geologist at Petrobras, having my first experience in this global struggle for oil."

In the same year, Petrobras discovered the Majnoon Oil Field, at the time a desert region, a super-giant oil field located 37 miles from Basra in southern Iraq and about 12 miles from the Iranian border. It is one of the richest oil fields in the world with an estimated 38 billion barrels of oil in place.

(New seismic work reveals those reserves might top 47 billion barrels.)

The name "Majnoon," incidentally means "crazy" in Arabic – and there was (and is) a crazy amount of oil in the area.

It was at that point that the role of politics in geology made its first impression on Estrella.

"Because of this immense energy wealth, the Iraqi government suspended the contract and negotiated its termination," he said.

When the 1973 Oil embargo began – when Arab members of OPEC, including Iraq, cut production and banned exports to countries that supported Israel, Brazil was not a supporter of Israel and so was not affected, thus protecting its oil supply. The relationship between Iraq and Petrobras was strengthened.

Estrella was there for all of that.

He stayed in Iraq for two more years before returning to Brazil.

Retired in Protest

In 1982, he joined Cenpes, the research center of Petrobras, formed in the early '60s to anticipate Brazil's energy needs. He assumed the general superintendency of the organization in 1988.

He retired in 1993.

Against his will.

"I retired from Cenpes in protest against an authoritarian, shameful, and morally unethical decision by the then-president of Petrobras, who assaulted the entire body of Cenpes employees. As the general superintendent of the organization, I could not accept this," he explained.

"Making Brazil sovereign and self-sufficient in energy has always been Petrobras' sole objective since its creation," he said.

In his career, whether at Cenpes or elsewhere, he's had little patience for whomever he felt thwarted that mission.

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"Scientific, technological, and engineering development is a continuous, permanent, very dynamic industrial activity; it is always unfinished," Estrella explained. "Innovation is the challenge that never ends. One of the characteristics of a research, development, and engineering center is precisely to innovate, to seek continuous improvement of industrial processes, even more so when great challenges are faced."

That, more than anything, has been his single-minded pursuit in the industry.

'Un-retirement'

He is known as the "father of pre-salt" – and this title too he swats away – which refers to his promotion of the geological model that vast oil and gas reserves would be located beneath the seabed and a thick layer of salt.

His reluctance to accept the title notwithstanding, it was due largely to his efforts that the discovery of those extraordinary Brazilian pre-salt provinces resulted.

"I am a survivor of the long process of transforming Petrobras into a major global oil company, in which I participated along with a generation of professionals, both from the company and from partner companies and, very importantly, from Brazilian universities," said Estrella.

He un-retired years later, however, thanks in part to politics. It was a reemergence that occurred, he said, because the nationalist governments of presidents Luiz Inácio Lula da Silva, 2003-11, and then Dilma Rousseff, 2011-16, embraced his view of science and technology.

In 2012, Estrella was honored with the appointment as director of exploration and production at Petrobras – a position he held for nine years, the longest in the company's history.

"It was a period in which the scientific and technological competence of our exploration teams – already proven in the Campos Basin – enabled Brazil, in 2006, to achieve volumetric self-sufficiency in oil and, subsequently, the discovery of the extraordinary pre-salt oil province, which guarantees Brazilian sovereignty to develop a national developmental project that ensures not only Brazilian industrial development but – certainly more importantly – the overcoming of the historical and shameful social injustice that marks Brazilian society," Estrella explained.

Estrella in 2008, at Campos Basin

Estrella receives a small carpet as a souvenir at the 2011 World Petroleum Congress.

He sees an industry with enormous potential, to not only satisfy the world's energy needs, but to be a force for good.

The Ever-Unfinished Struggle

He said of his career, generally, and the Schmitt Award, specifically, that the exciting aspect about the industry is the challenge of the great advances.

"And in the oil industry – which has exploration activities, with the need for gigantic investments and a high risk of success to be faced – scientific and technological development is the main and indispensable basis for meeting this challenge. And, certainly, managerial decisions that support this path," Estrella said.

The oil industry, of all industrial activities, is a collective endeavor, he noted, which means that he recognizes the personal contribution of each of the workers involved and with whom he's worked and how the successes and failures in pursuit of energy are always collective.

There is something else, as well.

Yes, politics.

"But, since immense financial and global political interests are equally involved, ethical/ideological and political conceptions are equally decisive in the decision-making process," he said.

In his more than eight decades, he knows that scientific, technological, and engineering development are continuous.

"It is always 'unfinished.' Innovation is the challenge that never ends," he reiterated.

"I belong to a people whose permanent and ever-unfinished struggle has national sovereignty and the overcoming of immense and unacceptable injustices and social inequalities as permanent objectives," he added.

For Estrella, his love for the energy independence of Brazil and for the country itself, both in terms of justice and democracy, has been his driving motivation.

"My connection and affection for Brazil: no different from most of the Brazilian people, who continue in this struggle," he said.

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Subsurface Energy to Power focuses on how to solve our looming energy / electricity needs (data centers, communities) by focusing on subsurface resources that can be quickly harnessed for power generation. Natural gas, geothermal, hydrogen, and lithium are key. We explore new solutions including micro-grids, data centers, electricity co-op tie-ins, and bit-coin mining to avoid waiting on long-distance transmission lines, pipelines, or other slow and costly infrastructure.

International Petroleum Technology Conference

Dubai, United Arab Emirates | 13–14 Jan. 2026

Founded in 2005, the International Petroleum Technology Conference (IPTC) is the flagship multidisciplinary technical event in the Eastern Hemisphere. The scope of the conference program and associated industry activities address technology and relevant industry issues that challenge industry specialists and management around the world. IPTC is sponsored by four industry organizations and societies, the American Association of Petroleum Geologists (AAPG); the European Association of Geoscientists and Engineers (EAGE); the Society of Exploration Geophysicists (SEG); and the Society of Petroleum Engineers (SPE).

NAPE 2026

Houston, Texas | 18–20 Feb. 2026

NAPE is the energy industry's marketplace for the buying, selling and trading of prospects and producing properties. NAPE brings together all industry disciplines; draws in decision-makers; focuses its participation on prospect generators; and hosts companies of all sizes, from small independents to majors. With the addition of minerals and non-operating, bitcoin mining and renewable energy sources to our oil and gas offerings, NAPE is the ultimate venue for energy deals.

AAPG 4th Annual Orphan, Abandoned, Idle, and Marginal Wells: Opportunities with Legacy Assets

Tulsa, Oklahoma | 25–27 Feb. 2026

The focus of this workshop is on the hidden benefits of orphan, abandoned, idle, and marginal (OAIM) wells, and the information and tools needed to take full advantage of new opportunities. Learn more about where the industry is now with OAIM wells, with changes in regulations, new funding sources and tax credits, particularly for combined plugging and field revitalization and enhanced oil recover (water and CO2 floods).

Navigating Energy Frontiers: Innovations in Oil & Gas for Complex Environments

Lima, Peru | 4–5 Mar. 2026

Join technical experts and industry leaders for interactive in-person Geosciences Technology Workshop (GTW) examining strategies to explore and produce energy resources in complex environments throughout Latin America and Western Canada. Plan now to join us for valuable information exchange and in-person connection with technical experts and business development professionals working in Canada, Argentina, Bolivia, Colombia and Peru.

Carbon Capture, Utilization, and Storage (CCUS) 2026

Houston, Texas | 30 Mar.–1 Apr. 2026

The Carbon Capture, Utilization, and Storage (CCUS) 2026 event is where the future of carbon management takes center stage. As a premier event for geoscientists and engineers, SPE, AAPG, and SEG unite industry leaders, government innovators, and academic trailblazers to share breakthroughs and real-world applications. Covering the entire CCUS value chain—capture, transport, utilization, storage, and economics—this event delivers cutting-edge insights, dynamic discussions, and powerful connections. From rising professionals to seasoned experts, you will find fresh ideas, new opportunities, and the knowledge to drive success in subsurface carbon management and beyond.

Offshore Technology Conference (OTC) Asia

Kuala Lumpur, Malaysia | 31 Mar.–2 Apr. 2026

The biennial Offshore Technology Conference Asia (OTC Asia) is where energy professionals meet to exchange ideas and opinions to advance scientific and technical knowledge for offshore resources and environmental matters.

3rd Edition: Structural Styles of the Middle East

Muscat, Oman | 6-8 Apr. 2026

Experience the intrigue and complexity of the Middle East's structural styles at this highly anticipated workshop taking place from 6-8 April 2026 in Muscat, Oman. Join us for an immersive journey as we delve into the fascinating interplay of tectonic phases and other key factors shaping the region's geological formations. Don't miss this unparalleled opportunity to gain cutting-edge insights and network with industry professionals at the forefront of structural geology.

AI and Machine Learning in Subsurface Energy

Houston, Texas | 7–8 Apr. 2026

This conference brings together leaders from academia and industry to discuss a wide range of Ai and Machine Learning technologies use to accelerate the development of subsurface energy, including oil and gas, geothermal, hydrogen, and lithium. Sessions will include topics such as reservoir modeling and management, risk assessment, drilling, completions, data management, data integration, seismic acquisition, processing, and imaging.

AAPG Energy Opportunities Conference 2026

Rio de Janeiro, Brasil | 28–30 Apr. 2026

Engage with decisionmakers at Energy Opportunities 2026, a premier conference highlighting trends, technology and business opportunities for professionals working in exploration, as well as on energy transition and sustainable development initiatives. Plan now to be a part of this elite event connecting you with the people, assets and trends shaping the future of energy.

Offshore Technology Conference (OTC)

Houston, Texas | 4–7 May 2026

The Offshore Technology Conference (OTC) is where energy professionals meet to exchange ideas and opinions to advance scientific and technical knowledge for offshore resources and environmental matters. OTC is supported by 15 industry organizations and societies, who work cooperatively to develop the technical program. OTC also has endorsing and supporting organizations.

AAPG Global Training Events

5th Edition: AAPG/EAGE Hydrocarbon Seals of the Middle East

Kuwait City, Kuwait | 18–21 May 2026

This three-day workshop will bring together academic and industry professionals to share knowledge, case studies, advanced technologies, techniques, and workflows essential for understanding and predicting seals for hydrocarbon accumulation and CO_2 storage across the Middle East.

Finding New Elephants: New Insights from Hydrocarbon Exploration Along the Southern African Margin and Onshore

Windhoek, Namibia | 16-17 Jun. 2026

During this workshop, a series of (by invitation only) presentations will focus on updates detailing the deep-water plays, current understanding, and future potential expansion along the South Atlantic Margin. The emerging onshore clastic and carbonate plays, and the rejuvenation of exploration blocks and legacy discoveries in Namibia will also be featured. Additionally, insights from geological analogues applicable to understanding key questions affecting future oil and gas exploration and development activities will also be discussed.

Unconventional Resources Technology Conference (URTeC) 2026

Houston, Texas | 22-24 Jun. 2026

The Unconventional Resources Technology Conference (URTeC) continues to be the best opportunity you'll have to exchange information, formulate strategic ideas and solve problems to manage and optimize your unconventional resource plays. Leveraging from all technical backgrounds and disciplines, URTeC is critical to you and your business by delivering the science, technology, and commercial opportunities on what's working with our current business environment. Plan now to attend URTeC 2026, 22–24 June at the George R. Brown Convention Center in Houston, Texas

AAPG | SEG International Meeting for Applied Geoscience & Energy (IMAGE) 2026

Houston, Texas | 17-20 Aug. 2026

IMAGE is the world's premier gathering for geoscientists, energy professionals, and industry leaders to connect and innovate. This dynamic event provides an influential platform for sharing best practices, discovering solutions, and developing new perspectives and strategies to challenge and plan for what's ahead. A global audience from all sectors of geosciences and energy come together to collaborate and network through a comprehensive technical program with more than 1,100 presentations, engaging panel discussions, hands-on workshops and courses, and a unique exhibition experience. Don't miss this unique opportunity to connect with the global geoscience and energy community.

AAPG.org/events

Recent Developments in Ocean Acidification

How declining ocean pH is accelerating, why it matters, and what recent studies reveal

By RASOUL SORKHABI

Recent research indicates that continued decreases in the pH of ocean water – a process called ocean acidification – can turn into a marine life catastrophe.

The oceans and saline seas cover 71 percent of the planet's surface and contain 97 percent of global waters, and they all form a single body of water. OA has been studied mostly over the past two decades. Let's look at some recent developments around this topic.

The Chemistry Behind Ocean Acidification

Oceans absorb about 30 percent of atmospheric carbon dioxide. As carbon dioxide builds up in the atmosphere, oceanic carbon dioxide also increases. Dissolved carbon dioxide in ocean water produces carbonic acid, which then splits into bicarbonate (HCO_3^-) and hydrogen (H^+) ions. The added hydrogen ions lower the pH value of ocean water and dissolve carbonate minerals – the building blocks of shells and skeletons for calcifying marine creatures, from coral reefs and oysters to pteropods.

London's Natural History Museum houses specimens collected during the 1872–76 expedition of the HMS Challenger. A group of British micropaleontologists have compared these planktonic foraminifer samples with those of the same species collected in 2009–16 from the same region in the eastern equatorial Pacific Ocean. Their study published in *Nature Scientific Reports* shows that the 21st-century specimens had much thinner shells.

Accelerated Ocean Acidification

In a study published in *Science Advances*, Swiss scientists reconstructed the progression of OA from 1800 to 2014. They estimate that the average pH values for ocean waters at 0 to 100-meters deep decreased from 8.17 to 8.05. For water depths of 100 to 500 meters, it decreased from 8.0 to 7.9 units. The aragonite saturation state decreased from 3.31 to 2.7 for water depths from 0 to 100 meters and from 1.87 to 1.53 for water depths from 100 to 500 meters. The researchers pointed out that nearly 50 percent of these decreases occurred from 1994 to 2014.

Moving Toward Solutions

The most widely proposed solution to OA is reducing carbon dioxide emissions into the atmosphere. Scientists have also suggested methods to de-acidize the oceans. Howard Herzog and Niall Dowell summarize these methods in Carbon Removal:

1. Ocean Alkalinity Enhancement, notably by injecting $Ca(OH)_2$ (hydrated line) into the oceans and thus increasing the ocean's uptake capacity of carbon dioxide
2. Ocean fertilization, especially by adding iron (in the form of iron sulfate) to iron-deficient areas to bloom phytoplankton and thus accelerate carbon dioxide removal through photosynthesis
3. Direct ocean capture removes carbon dioxide from ocean water by electrochemical treatment before the water is released back to the ocean

In another study in *Journal of Sea Research*, a group of Chinese scientists analyzed the ocean chemistry database from the Copernicus Marine Environment Monitoring Service and found that for the period 1985–2022, the surface ocean pH level decreased 0.024 units per decade; the aragonite saturation state decreased by -0.012 per year; and the calcite saturation state decreased by -0.020 per year for the tropical and subtropical regions where coral reefs live. The researchers also noted that these declines accelerated by 1.4 times in the 21st century.

Environmental Impacts of Low pH Oceans

Ocean water is usually slightly alkaline because it contains salts essential to marine life. The ocean pH scale ranges from 7.8 to 8.3 regionally, depending on latitude, proximity to coasts, water depth, temperature, and biological activity. The long-term global average of surface water is about 8.1 which has decreased by 0.1 units since the 19th century. This value still indicates alkaline water; nevertheless, the pH decrease trends toward acidification. A pH drop of 0.1 might seem to be insignificant, but pH scale is logarithmic, so a 0.1-unit decrease is a 26-percent increase in the concentration of hydrogen ions ($10^{0.1}$ is equal to 1.26).

Small but steady changes in the pH level can have drastic impacts on marine creatures. Experimental work verifies this. For instance, an experimental study of gastropod shells by Chinese scientists reported in Anthropocene shows that after 85 days of exposure to waters with pH values from 8.1 to 7.1, the shell growth was significantly hindered at pH levels lower than 7.5, and shell dissolution became prominent at pH lower than 7.1.

Drops in ocean pH levels during the mass extinction events of the geological past offer additional insights. According to a study by Mingsong Li and colleagues in *Nature Geoscience*, during the Paleocene-Eocene Thermal Maximum 56 million years ago, ocean pH decreased by 0.46 units from 7.91 to 7.45. Another study by Molly Trudgill and colleagues in *Nature Communications* indicates that during the Triassic-Jurassic extinction at 201 million years ago the ocean pH level dropped by 0.3 units. While such studies depend on proxy data, it appears that major and long-term decreases in pH levels of ocean water can have far-reaching impacts on marine life.

Currently, all de-acidification methods (see sidebar) are small-scale operations. They require additional financing and policy shifts. Plus, their side effects on ocean ecosystems still need to be investigated. Some scientists believe that ocean de-acidification is probably a much slower process than OA and encourages carbon dioxide emissions into the atmosphere; Nevertheless, these technologies might have their own niches.

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Changing Climate

Key highlights from Brazil, where the annual climate summit was held in November.

By SHANGYOU NIE

Brazil hosted the 30th U.N.

Climate summit Conference of Parties in early November in Belém, the gateway to the Amazon River. Delegates from 194 countries and regions attended. Organizers called the meeting for "Global Mutirão," which means "collective action" in the indigenous Tupi-Guarani language. They touted several achievements but failed to deliver a roadmap to phase out fossil fuels, as the host country Brazil and several other progressive countries had hoped.

Countries, companies, and international organizations are adjusting their positions and actions toward the COP and climate and energy transition initiatives. The United States did not participate in COP30 – its first absence from the conference in the past 30 years.

Key Achievements

Many believe the most significant victory for COP30 was renewed support from the majority of the member countries to continue the fight against climate change. As host, Brazil was the driving force and called for that aforementioned collective action as the world faces strong headwinds against energy transition and climate change initiatives. Simon Stiell, the United Nation's climate change executive secretary, said during his closing speech that "COP30 showed that climate cooperation is alive and kicking, keeping humanity in the fight for a livable planet."

By the time the event took place, 122 countries, representing some 75 percent of global emissions, had submitted "Nationally Determined Contributions" to reduce their greenhouse emissions. NDCs are based on the goals set by each country. Before COP30 started, only 79 countries had submitted their NDCs. Participating countries also see the quality for NDCs as much higher than previous submissions, with the aggregate ambition to limit temperature to within 2.1 to 3.2-degrees Celsius by 2100. This is a significant improvement over the temperature increase projected 10 years ago, when the average global temperature was on a trajectory to rise between 2.8 and 4.8 degrees by 2100, if no action would have been taken. COP30 admitted for the first time that the world is more likely to overshoot the 1.5-degree Celsius target set originally in Paris 2015.

COP30 established a 5+1 framework to coordinate "high ambition" governments, businesses, and civil society for actions across sectors and regions. The 5+1 represents:

1. Energy, industry, and transport (19 countries pledged to quadruple sustainable fuels use by 2035)
2. Forests, oceans and biodiversity
3. Agriculture and food systems
4. Cities, infrastructure, and water
5. Human and social development

The +1 axis crosscuts the other five axes: Financing, technology, and capacity-building.

Brazil also launched the Tropical Forest Forever Facility to raise funds for forest protection. Brazil, Indonesia, France, Germany, and Norway pledged a total of $6.7 billion. China and the United Kingdom showed willingness to join the funding pledges in 2026.

Meaningful Disappointments

Brazil led the initiative with regard to fossil fuels and deforestation, as member countries failed to reach a consensus during the conference. Brazil and a number of countries from the High Ambition Coalition tried to push for a detailed roadmap to transition away from fossil fuels. This mandatory global roadmap, packaged in what some felt was strict phase-out language, was opposed by Russia, Saudi Arabia, China, India, and Nigeria. Opponents argued that forced transition would lead to economic stagnation and energy insecurity. Instead, they prefer that individual countries choose their own energy transition steps. China also seemed reluctant to take on a more active leadership role in the fight against climate change.

(See related article this issue on Brazil's post-COP30 energy trajectory.)

According to the *Financial Times*, quoting Akash Deep, the world has retired about 300 gigawatts of coal-fired power since Paris 2015, but the world added 600 gigawatts of new coal-fired power plants along the way, with 600 gigawatts more in the pipeline. This reflected the difficulty in phasing out fossil fuels.

The Guest List

With 56,118 registered attendees, COP30 became the second most-attended COP after COP28 in Dubai, which attracted more than 80,000. More than 5,000 people joined virtually.

According to conference organizers, 57 heads of state and government attended COP30, including Brazilian President Luiz Inácio Lula da Silva, U.K. Prime Minister Keir Starmer, President Emmanuel Macron from France, Chancellor Friedrich Merz of Germany, European Commission President Ursula von der Leyen, and U.N. Secretary-General António Guterres. California's Governor Gavin Newson attended part of COP30 to show that not all Americans agree with President Trump's withdrawal from the Paris Agreement.

According to Carbon Brief, China sent the second largest delegation with 789 representatives. Brazil topped the charts with 3,805 attendees, many media, NGOs, and nonprofits also sent several representatives to attend.

Just before the conference started, there were reports that the small city of Belém did not have enough hotel beds to host all the attendees and room prices skyrocketed. Brazil offered free cabins on cruise ships moored in the city to enable delegates from low-income countries to attend.

Looking Ahead

COP31 will be another milestone for the world at large, and the energy world in particular. Turkey will host COP31 in 2026 and will be responsible for setting the agenda. In a unique arrangement, Australia has been appointed the country to lead the negotiations leading to COP31. Australia and several Pacific Island countries will help identify the financial needs for Small Island Developing States in preparation for the discussion on the issue during COP31.

At that point, the Trump administration will be in the middle of its second term, with a clear policy promoting energy addition, rather than energy transition. How will the rest of the world adjust their approach and actions to continue the fight against climate change?

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Where Geology Meets Coffee

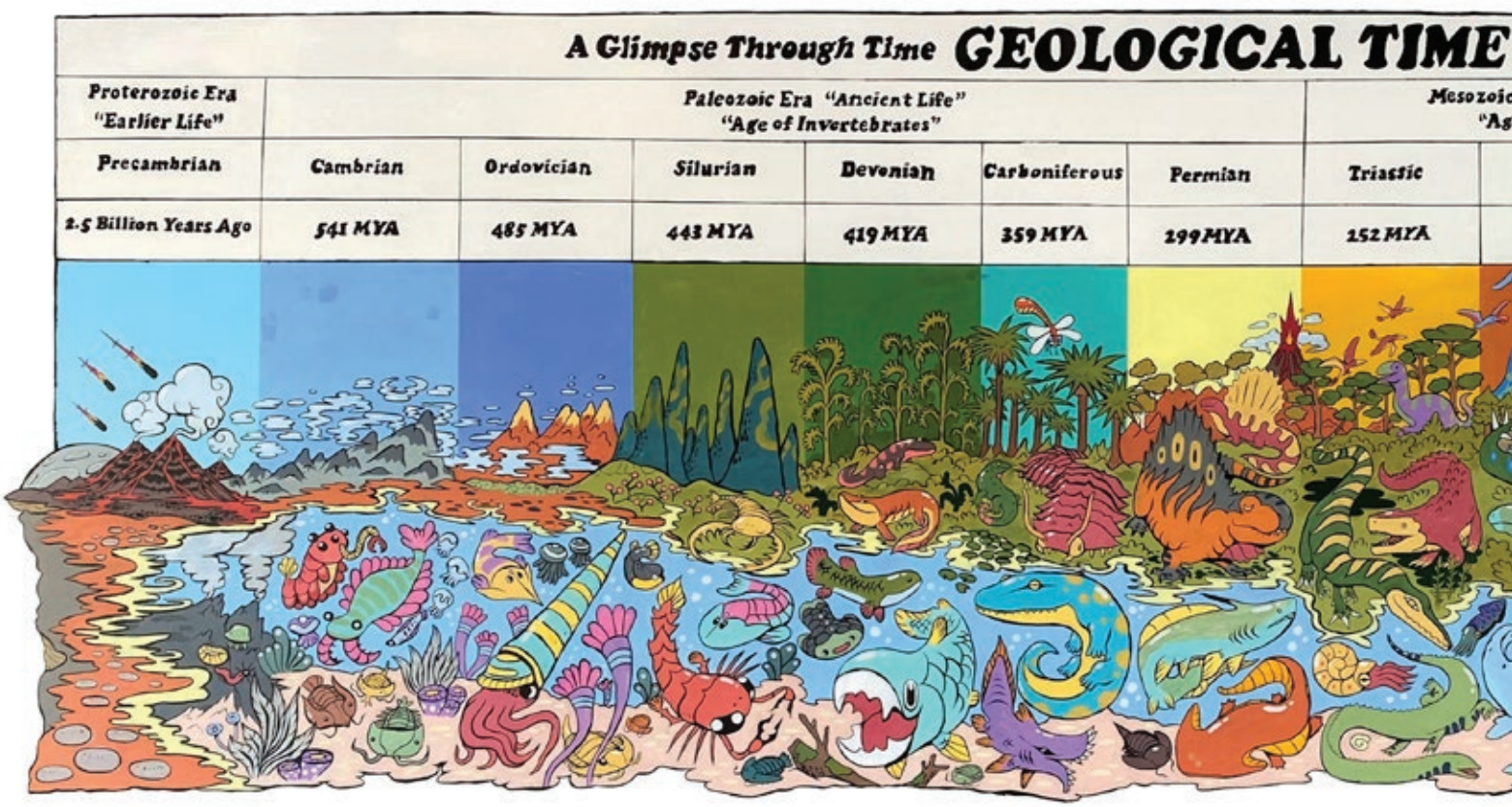
Coffee combines its owners' love for geology with their passion for education, community, and specialty roasts.

By KELSEY KOSH

Gemma Hildred and Brian Hinkle

Gemma Hildred and Brian Hinkle realized during COVID that their community in Houston's Spring Branch neighborhood didn't have a gathering place. "We realized it was a bit of a desert for a coffee shop," Hildred said. The two began planning a venue that would merge their two passions – coffee and geology. Hildred is a geologist by trade and has worked for Chemostrat since 2006. A Welsh native, she met Brian at a bar after being stationed in Houston a few years later. Hinkle worked for Ford at the time, selling commercial trucks. The two hit it off and Hinkle took up his own interest in geology. Together, the couple has traveled the world fossil hunting and scoping out new breweries, coffee shops, and geological highlights.

For their own spot, they hoped to bring it all



together – minus the beer, that is. Hinkle learned more and more about specialty coffee while at home during the lockdowns and Hildred had long ago perfected baking her own scones and British sausage rolls.

"It's loose sausage meat seasoned inside flaky pastry," she explained.

The Concept Takes Off

The two launched their concept in January 2021 under the name "Cambrian Coffee," tying in Hildred's geologist and Welsh roots.

"The name 'Cambrian' works out so well because we likened the Cambrian period with the largest explosion and diversification of life on Earth," said Hinkle. "It's very much like Houston. It's the fourth biggest city in the country, and soon they say it will be the third. It's also one of the most diverse cities in the country … 'Cambrian' also references (in Latin) the country of Wales, where some of the original Cambrian rocks were exposed, and that's where Gemma grew up."

Though challenging to kick off at the height of COVID, the coffee shop's reception has been solid.

"We do have a really strong following from people into geology, dinosaurs, paleontology, all that," said Hinkle. "But at the end of the day, we're still just a local neighborhood shop."

He quit his job to manage the shop, including its coffee sourcing and inventory.

"We like to source our coffee from a lot of small farms and really specialty stuff," said Hinkle. The shop's guest roasters, which rotate a few times per year, typically come from places where the couple have traveled.

Overall, however, Hinkle tries to keep the coffee selection approachable to all – whether they come in for a simple drip coffee or a done-up latte. Hildred bakes all the pastry items in-house and works part-time with Chemostrat. The British sausage rolls are her biggest hit.

"During the first six months we were open, we had sold over 10,000," she said.

The couple has hosted many educational events around geology, and Hildred participated in an event discussing geological factors' effects on coffee at IMAGE'25, co-hosted by the AAPG Women's Network, the Midwest Geosciences Group, and the Association for Women Geoscientists' Lone Star Chapter.

"I would love to do more educational sessions in (the shop)," said Hildred.

The couple have considered franchising or expanding to other markets, but for now, they hope to grow and maximize the space in Houston that they have.

"We always keep ourselves flexible if the right opportunity comes along," Hinkle said. "It's been five years … and we are always mindful of staying sharp and always trying harder and doing better."

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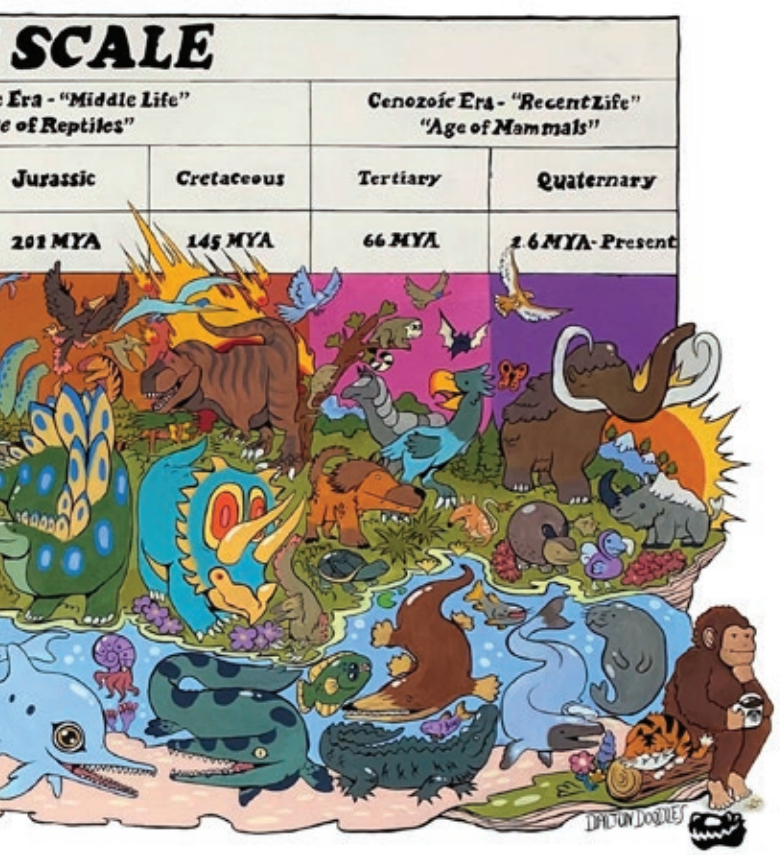

Success in the Baking

The British sausage rolls Hildred bakes are considered a staple of British cuisine and can be eaten hot or cold. They are common at lunches, gatherings, social events, and parties. Though they look similar to a kolache, they feature loose sausage in puff pastry instead of a packed sausage or sweet filling inside a yeast pastry.

"A lot of people come in just casually and say 'Yeah, I'll take one of those.' Then, they come back and say 'These things are amazing!'" said Hildred.

The Limits of Seismic Certainty

Integrative technology for lowering uncertainty in upstream oil and gas

By SUBRATA BANERJEE

Recent years have seen a clear decline in discovered reserves, driven by reduced drilling investment and the increasing complexity of exploration. Large, simple structural traps are mostly exhausted, pushing exploration toward deeper, more geologically complex plays. This shift requires improved seismic imaging and closer interdisciplinary integration. Two examples will illustrate these themes in what follows.

Exploration always carries uncertainty, whether in source, reservoir, trap, or migration, and seismic interpretation is central to assessing these uncertainties. Although quantifying uncertainty remains difficult, several practical approaches have contributed to more reliable exploration and development outcomes.

The first example shows how an independent company achieved near-field success by combining geoscience technologies with strong regional geological understanding, validating the trapping model through adaptive seismic imaging and amplitude-versus-offset analysis.

The second example, from the West Delta Deep Marine project, highlights how technology and cross-disciplinary collaboration help address uncertainties in reservoir channel connectivity. Seismic tools were key to distinguishing multiple channel systems, reducing connectivity uncertainty, and improving infill well planning and reservoir management.

A Mid-Norway Case Study

The block lies on the Halten Terrace offshore Mid-Norway. Exploration targeted Upper Jurassic syn-rift plays, focusing on prospects defined by combined structural–stratigraphic closures and clear direct hydrocarbon indicators. The main pre-drill uncertainty concerned the trapping configuration, which was refined using advanced seismic imaging (figure 1). Beam depth migration – superior to conventional Kirchhoff migration for complex, steeply dipping structures – improved fault delineation and strengthened confidence in the entrapment model. AVO analysis and fluid-factor interpretation (figure 2) provided further support for hydrocarbon presence.

Two subsequent wells targeting Upper

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The success story in opening a new play segment demonstrates how advanced technology, when combined with a strong understanding of both regional and local geology, can unlock new opportunities.

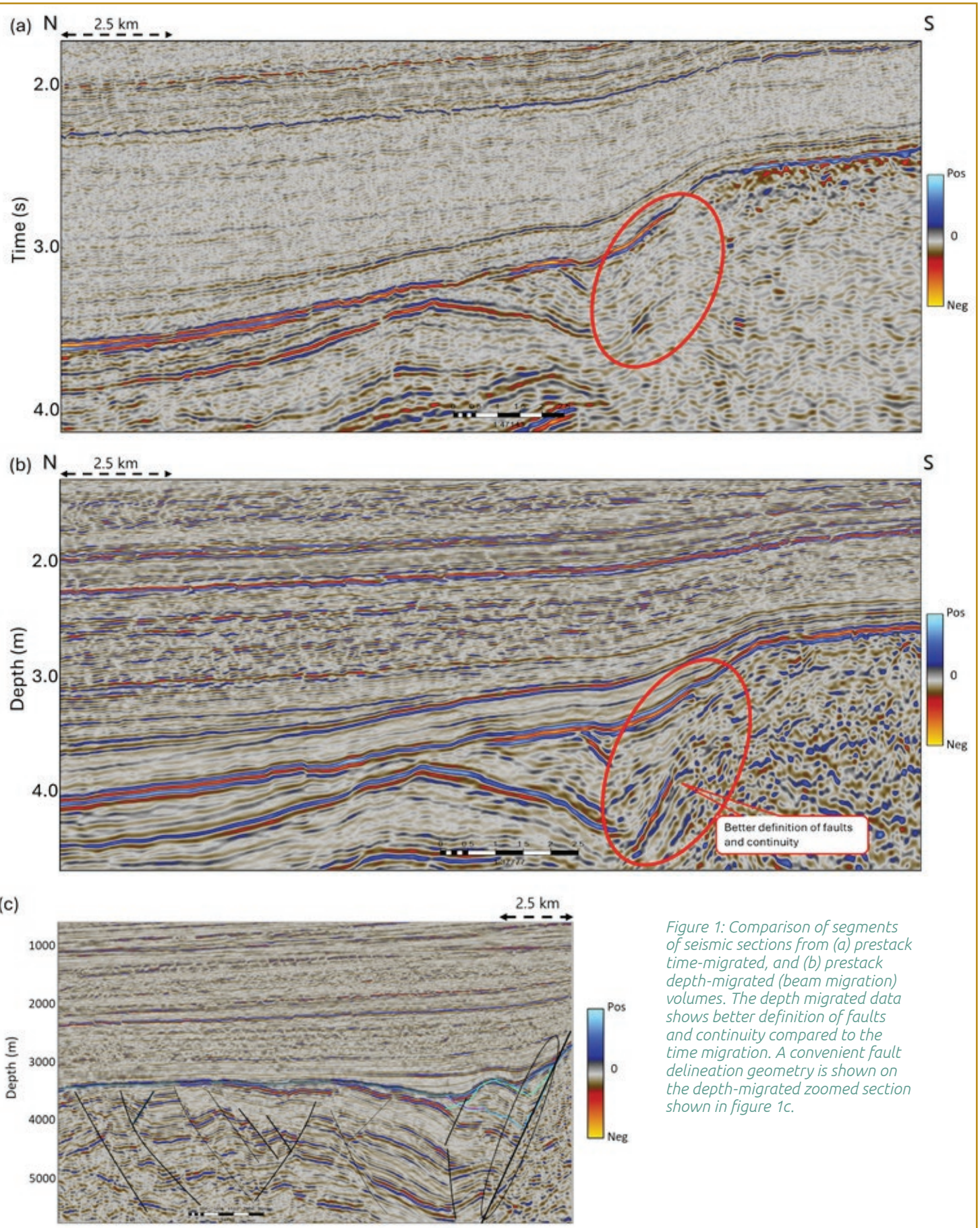
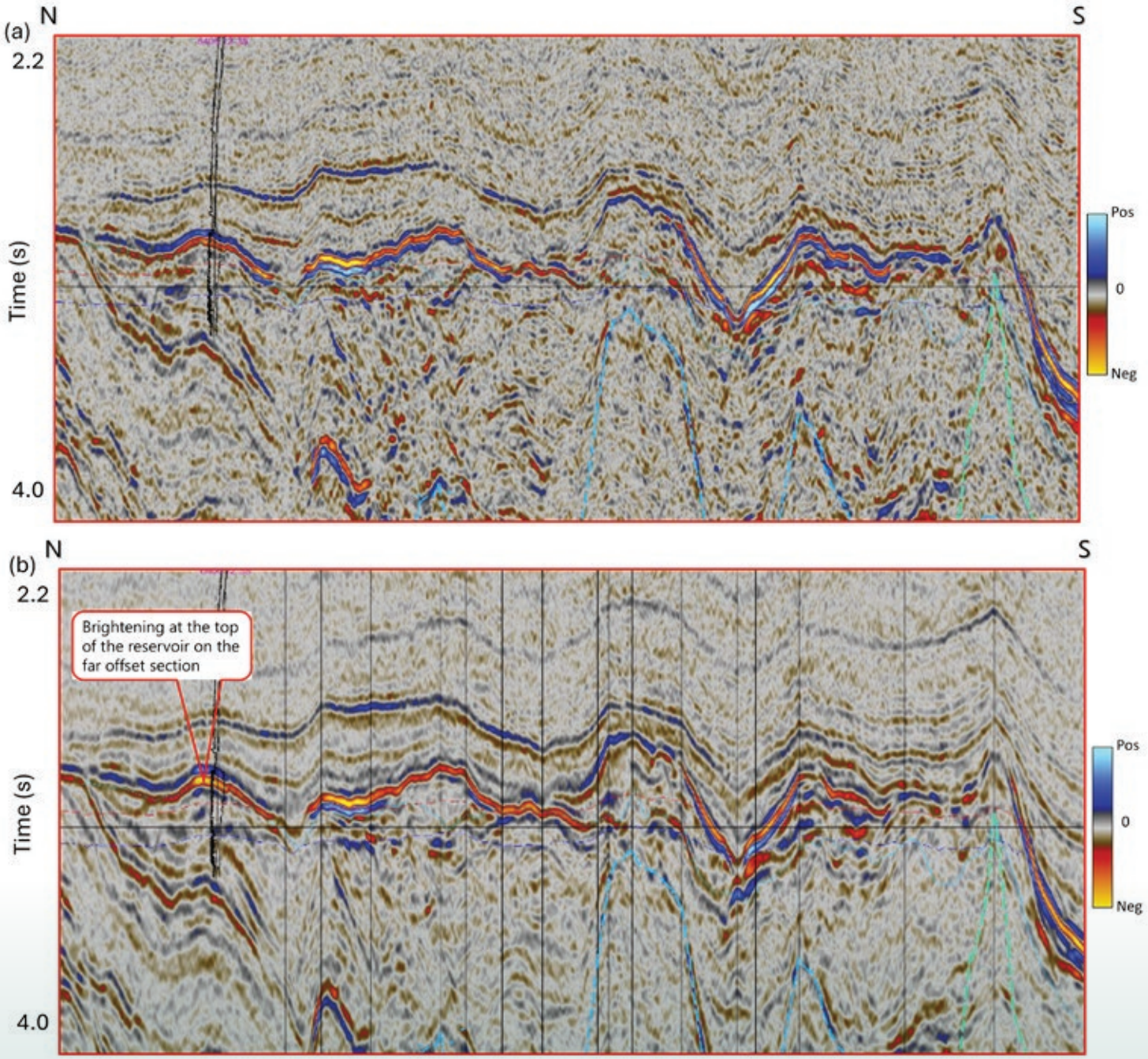


Figure 1: Comparison of segments of seismic sections from (a) prestack time-migrated, and (b) prestack depth-migrated (beam migration) volumes. The depth migrated data shows better definition of faults and continuity compared to the time migration. A convenient fault delineation geometry is shown on the depth-migrated zoomed section shown in figure 1c.



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Jurassic syn-rift prospects encountered commercial oil and gas, expanding the play to include new segments, reservoir types, and trap configurations.

Notably, major operators had previously dismissed the block as non-prospective. The eventual breakthroughs were made by small independent companies operating without large datasets or extensive organizational support. Understandably, their success stemmed from strong local geological understanding, focused application of seismic technologies, and sufficient resources to iteratively test and refine exploration concepts.

A West Delta Deep Marine Case Study

Assessing reservoir connectivity and water resources is critical for predicting performance in infill drilling. This case study from the West Delta Deep Marine field illustrates the uncertainty in estimating sand connectivity using seismic data. Seismic attributes were used to identify individual channels and their architectural elements, and these interpretations were integrated with well data to infer depositional facies and connectivity. However, production results from later infill wells revealed significant discrepancies, underscoring the limitations of relying solely on seismic interpretation.

The WDDM concession lies 50 to 100 kilometers offshore in deep water on the northwestern Nile cone, covering 6,150 square kilometers. Most gas fields are

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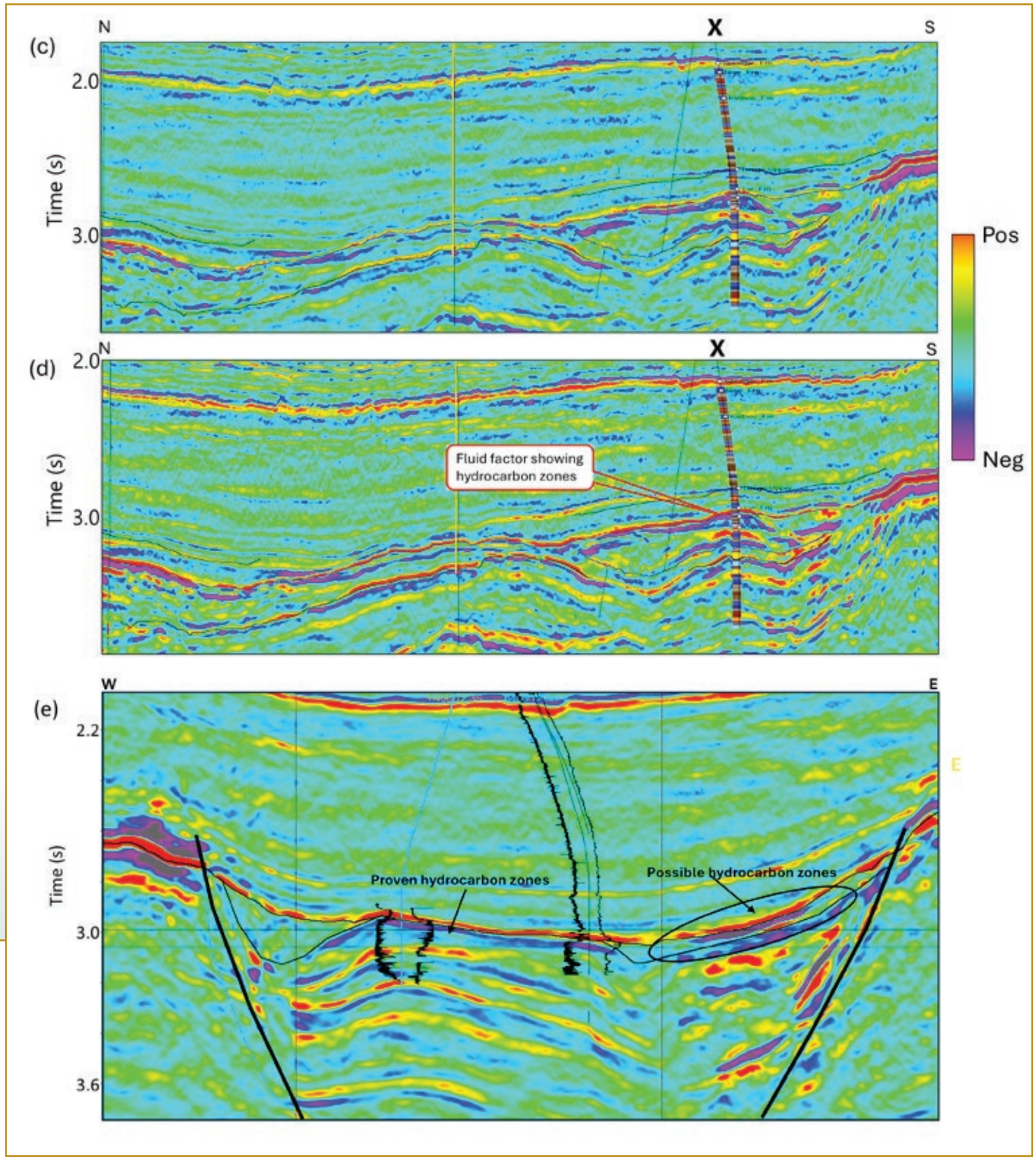

Figure 2: Comparison of segments of seismic sections from (a) near-offset, and (b) far-offset volumes. A brightening of the amplitude is noticed at the top of the reservoir on the far-offset section. A similar comparison segments of sections from fluid-stack volumes generated (c) before drilling of discovery well, and (d) after integrating the result of discovery well. Negative values of fluid stack have been interpreted as presence of fluid stack, which are seen prominently as indicated by the pointer text. (e) A zoomed section from a west-east fluid-stack section shows the proven and possible hydrocarbon zones.

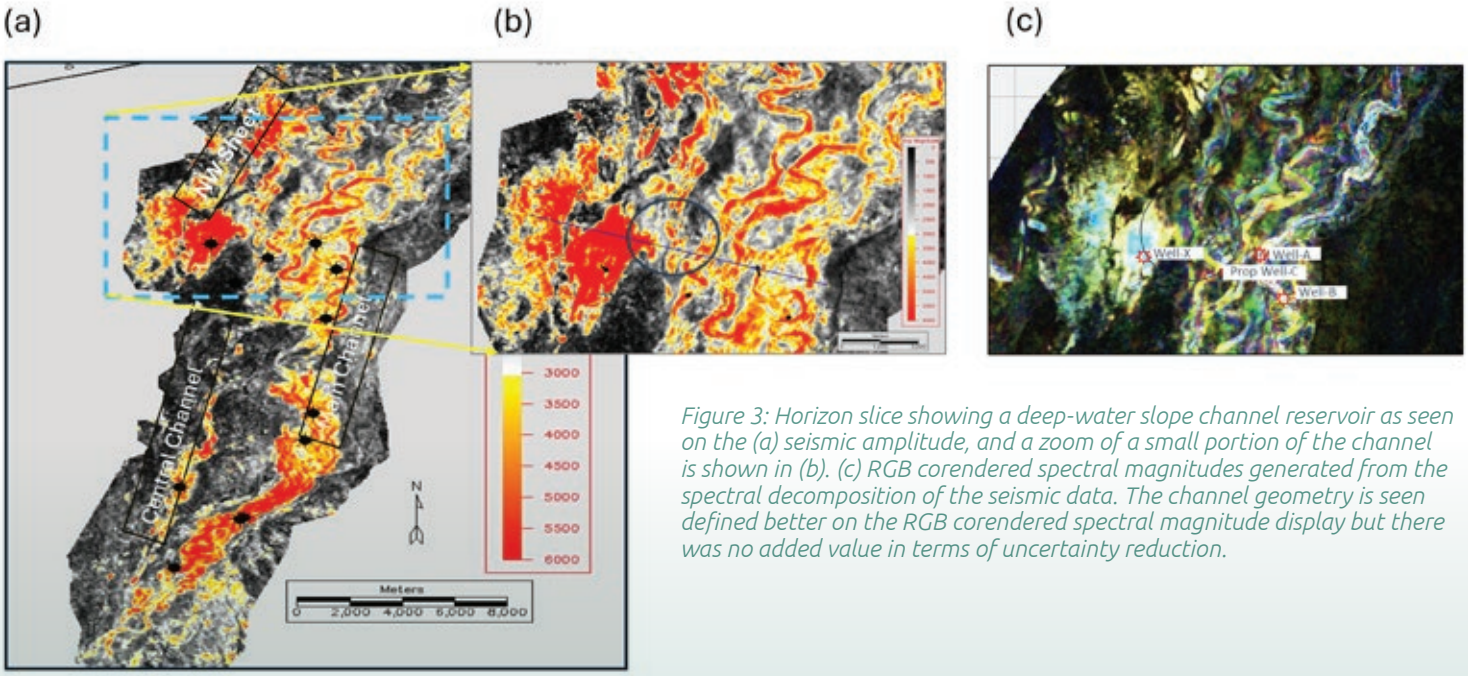

Figure 3: Horizon slice showing a deep-water slope channel reservoir as seen on the (a) seismic amplitude, and a zoom of a small portion of the channel is shown in (b). (c) RGB corendered spectral magnitudes generated from the spectral decomposition of the seismic data. The channel geometry is seen defined better on the RGB corendered spectral magnitude display but there was no added value in terms of uncertainty reduction.

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hosted within Pliocene turbidite slope-channel systems trending northeast-southwest to northwest-southeast across a gentle slope. Traps are stratigraphic at channel margins and a mix of structural and stratigraphic along channel axes. The Plio-Pleistocene reservoir architecture is well imaged on 3-D seismic (figure 3), and seismic amplitude maps help define channel evolution. Gas-bearing sands display a Class III AVO response.

The channel complex, comprising the Main Channel, Central Channel, and Northwest Sheet, forms a single canyon-fill system. Reservoirs typically include a stacked, sand-rich core belt with leveed wings. Seismic mapping suggested potential connections between these systems, particularly the Northwest Sheet and the Main Channel. Spectral decomposition and seismic inversion studies enhanced channel resolution but did not materially reduce uncertainty (figures 3 and 4). As a result, the base-case reservoir model assumed only partial connectivity and predicted pressure depletion in the Northwest Sheet.

However, when Well X was drilled in 2012, after seven years of production from Main Channel wells, it encountered virgin pressure, demonstrating that the Northwest Sheet is hydraulically isolated from the Main Channel complex (figure 5). This outcome highlights the persistent ambiguity of seismic-based connectivity predictions and the need for caution when using seismic alone to assess reservoir communication.

Experience with infill development

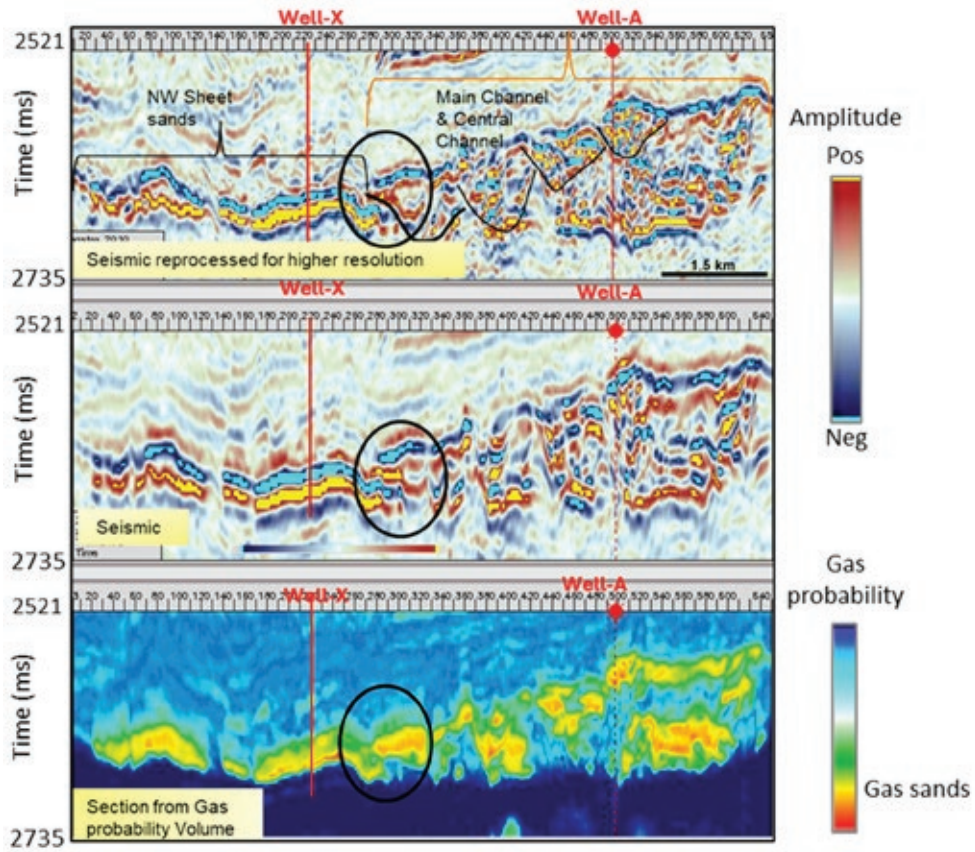


Figure 4: Comparison of sections passing through (reprocessed seismic data), (b) vintage seismic data, and (c) gas probability volume generated using the reprocessed seismic data. The sections pass through two wells drilled through the Northwest Sheet (Well X), and the main channel segment (Well A). The encircled area shows a possible area of connectivity of the segments. However, infill well drilled in the Northwest Sheet proved to be virtually isolated from the main channel.

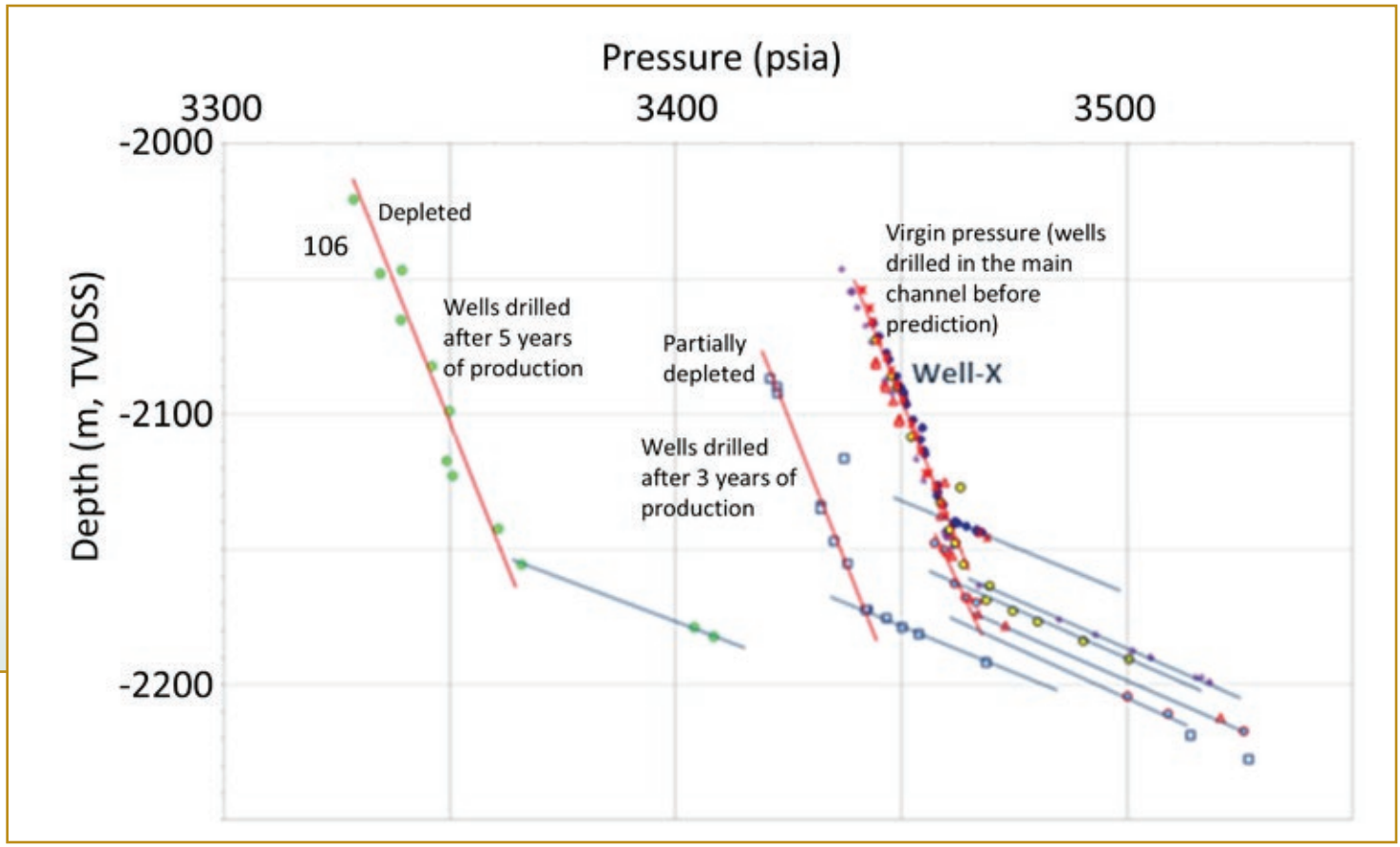


Figure 5: Pressure plot for different wells in the area, included the data from Well X drilled in the Northwest Sheet, which encountered virgin pressure (undepleted) and free water level came deeper than the wells drilled in the main channel. This proved the Northwest Sheet to be virtually isolated from the main channel.

in the WDDM shows that predicting reservoir connectivity across faults and areas with low-amplitude seismic response is highly uncertain. Pressure barriers and thief zones are frequently present at subseismic scales. Unless connectivity is well constrained, the preferred practice has shifted toward probabilistic methods. Connectivity between reservoir segments is now typically assessed using some advanced approach that spans scenarios from fully connected to fully isolated, with several intermediate cases. Consequently, connectivity becomes a key variable during history matching, helping achieve agreement with historical pressure behavior and/or water production rates. Forecasts of reservoir performance, including depletion patterns and well productivity, then depend on the history-matched model.

The Lessons Learned

The success story in opening a new play segment demonstrates how advanced technology, when combined with a strong understanding of both regional and local geology, can unlock new opportunities. Compartmentalization and uncertainty in reservoir connectivity remain major challenges throughout a field's life and are especially critical for infill development. The second case study reinforces that evaluating a broad range of geological models and fostering collaboration across disciplines are essential for reducing uncertainty and improving reservoir characterization.

As the industry moves into increasingly challenging environments, such as deepwater settings, geologically complex basins, and areas with significant stratigraphic variability, a dual strategy is required. This strategy pairs geoscience-driven technological innovation with strong interdisciplinary collaboration and communication.

__The Geophysical Corner__ is a regular column in the EXPLORER, edited by __Satinder Chopra__, founder and president of SamiGeo, Calgary, Canada, and a past AAPG-SEG Joint Distinguished Lecturer.

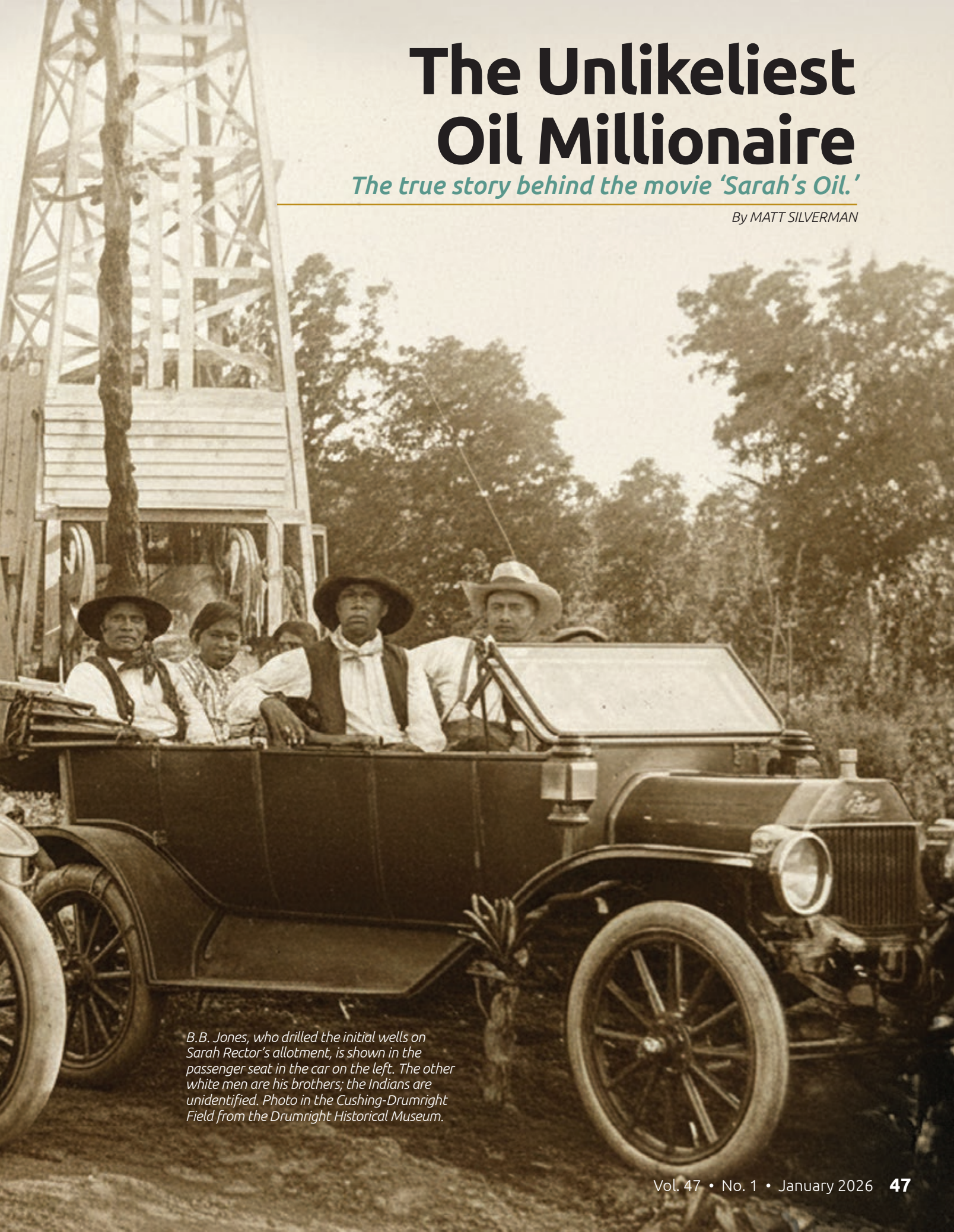
Subrata Banerjee has more than 40 years of experience in exploration and development geophysics, having worked across a diverse range of geological settings, including clastics, carbonates, and salt environments, in countries such as India, Thailand, UK, Egypt, and Norway. His expertise spans the full spectrum of geophysical workflows, seismic data acquisition, processing, and interpretation, with a particular strength in reservoir characterization and the integrated interpretation of geoscientific data for both exploration and development objectives.

Historical Highlights

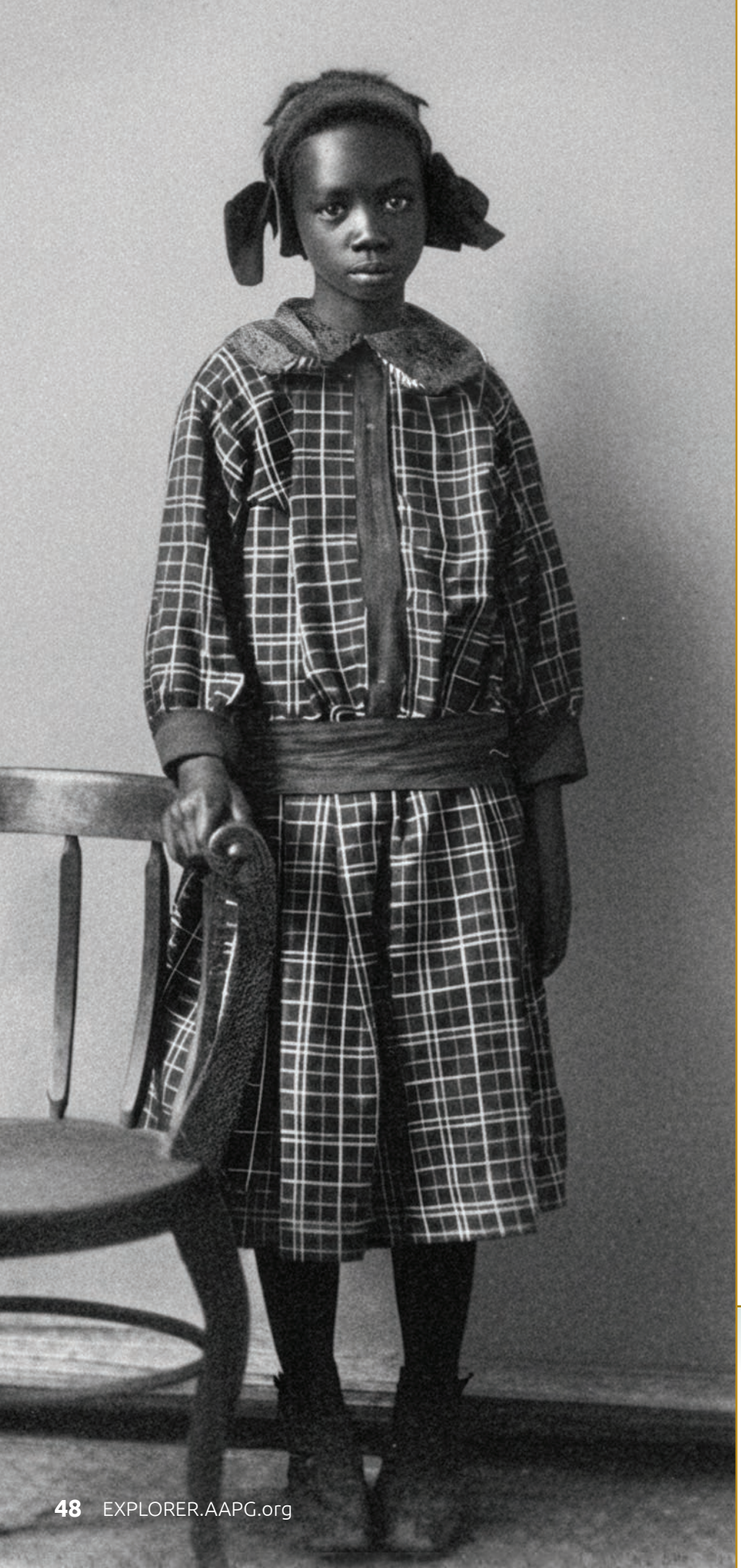
The Unlikeliest Oil Millionaire

The true story behind the movie 'Sarah's Oil.'

By MATT SILVERMAN



B.B. Jones, who drilled the initial wells on Sarah Rector's allotment, is shown in the passenger seat in the car on the left. The other white men are his brothers; the Indians are unidentified. Photo in the Cushing-Drumright Field from the Drumright Historical Museum.



Sarah Rector at about age 12, source "$10,000 a Month for a Little Negro Girl," by Florence Longley Fosbroke, American Magazine, Jan.-June 1915, No. 70, p. 60. (The authenticity of this photo has been generally accepted but is denied by some of Sarah descendants.)

The film "Sarah's Oil" was released in late 2025, inspired by the remarkable oilfield story of an African American girl in eastern Oklahoma whose income from oil royalties in 1915 was said to exceed that of the president of the United States. It is based on the true story of Sarah Rector, on whose land oil production made her one of the richest children in the world when she was only 11.

This tale has parallels to the David Grann book and Martin Scorcese movie, both titled "Killers of the Flower Moon" (see the February 2024 Historical Highlights). The true rags-to-riches story of Sarah Rector, however, focuses on one little girl and the huge fortune she made from the oil found on the 160-acre allotment she owned.

Freedmen and the Allotment

Sarah Rector was born in a small, weathered cabin near the town of Taft in Indian Territory in 1902, five years before Oklahoma became the 46th state. She and her family were known as "Creek freedmen," black members of the Native American tribe commonly called Creeks. Taft was one of Oklahoma's "all-black towns" established after Reconstruction, where freedmen and their descendants achieved a level of community self-governance. "Muskogee" (or "Muscogee") is what the Creeks called themselves, and the eponymous town is about 10 miles from her birthplace.

Some Creeks had owned black slaves in the southeastern United States prior to the tribe's brutal, forced removal and resettlement (along with the other four "Civilized Tribes") onto the newly designated Indian Territory's tribal lands during the Trail of Tears of the 1830s and later. Among these enslaved people were Sarah's great-grandparents.

The freedmen were emancipated after the American Civil War in 1866. Then in 1901 – as part of the federal government's much-abused policy to break up reservation lands that were traditionally held in common into individual plots – tribal members, regardless of age, were granted quarter-section allotments. Sarah's 160 acres weren't contiguous and weren't even in Muskogee County where she lived, but mostly near a horseshoe bend of the Cimarron River in

T18N-R7E in Creek County some 50 miles to the northwest. The mineral rights were included.

Much of the land granted to the Native Americans by the federal government under the Dawes Act of 1887 was thought to be undesirable for agriculture. Other acreage was also coveted (and subsequently – often fraudulently - acquired) by white settlers, cattlemen, the railroads, timber companies and coal miners. Had Uncle Sam known of the oil reservoirs below many of those allotments, including Sarah Rector's, the narrative would likely have been very different.

Discovery

The first commercial discovery of oil in Oklahoma was at the Nellie Johnstone No. 1 well, drilled near Bartlesville in 1896, about 90 miles from Muskogee. The 1905 discovery of the fabulous Glenn Pool Field south of Tulsa transformed that small town into the "Oil Capital of the World" and brought the oil boom within about 20 miles of Sarah's allotment. (The Glenn Pool was named for Ida Glenn, a Creek woman on whose land the discovery well was drilled.)

In 1909, Sarah's father Joe Rector, a farmer, was required by law to become her legal guardian, allowing him to manage the seven-year-old's property. Two years later he leased her rocky allotment to the Devonian Oil Co. from Pittsburgh for a dollar an acre, but that lease expired. Mr. Rector considered selling the allotment, which had become a substantial tax burden for the family, but leased it a second time for 50 cents per acre to a landman for a local businessman, B.B. Jones.

A wildcatter named Tom Slick had made an oil discovery five miles away, and Jones was one of the few who knew about it; he was a partner of Slick's. The Wheeler No. 1 came in at 400 barrels per day in 1912 and opened the huge, shallow Cushing–Drumright oil field, sparking an historic oil boom. The field has yielded more than 200 million barrels of oil, and the town of Cushing, long since known as the "Pipeline Crossroads of the World," became the primary delivery point for New York Mercantile Exchange trades of West Texas Intermediate crude oil futures.

In late August 1913, Jones drilled and completed his first well on Sarah's land, and the Muskogee Times-Democrat reported that it came in initially at 2,500 barrels per day. Sarah's lease included the standard one-eighth royalty, and with oil trading at about $1 per barrel, her 12.5-percent share was said to be worth some $300/day, roughly $10,000 today. Jones had hit a major producer, and Sarah looked to become one of the wealthiest children in the country as more high-volume wells were brought in on her allotment.

Cushing-Drumright is a structurally complex field that includes four domes and produces crude principally from the Layton, Wheeler, and Bartlesville sands, all Pennsylvanian. A major unconformity between the Bartlesville and the Cambro-Ordovician Arbuckle limestone suggests pre-Pennsylvanian uplift and erosion. Production was influenced by multiple periods of faulting, folding and erosion.

Opothle Yoholo (about 1830), the Creek chief who held Sarah Rector's great-grandmother Mollie in bondage. Library of Congress digital file LC-DIG-ds-03373, from a painting by Charles Bird King.

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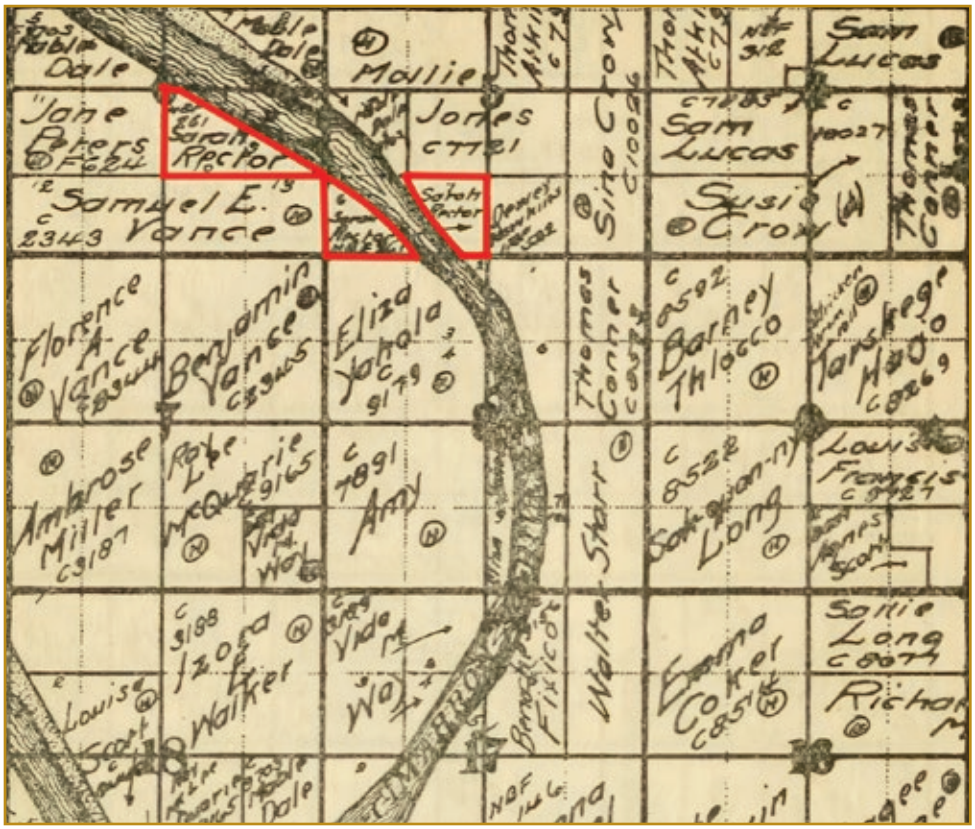

Sarah Rector's land allotment on the Cimarron River is highlighted in red on "Hastain's Township Plats of the Creek Nation," 1910.

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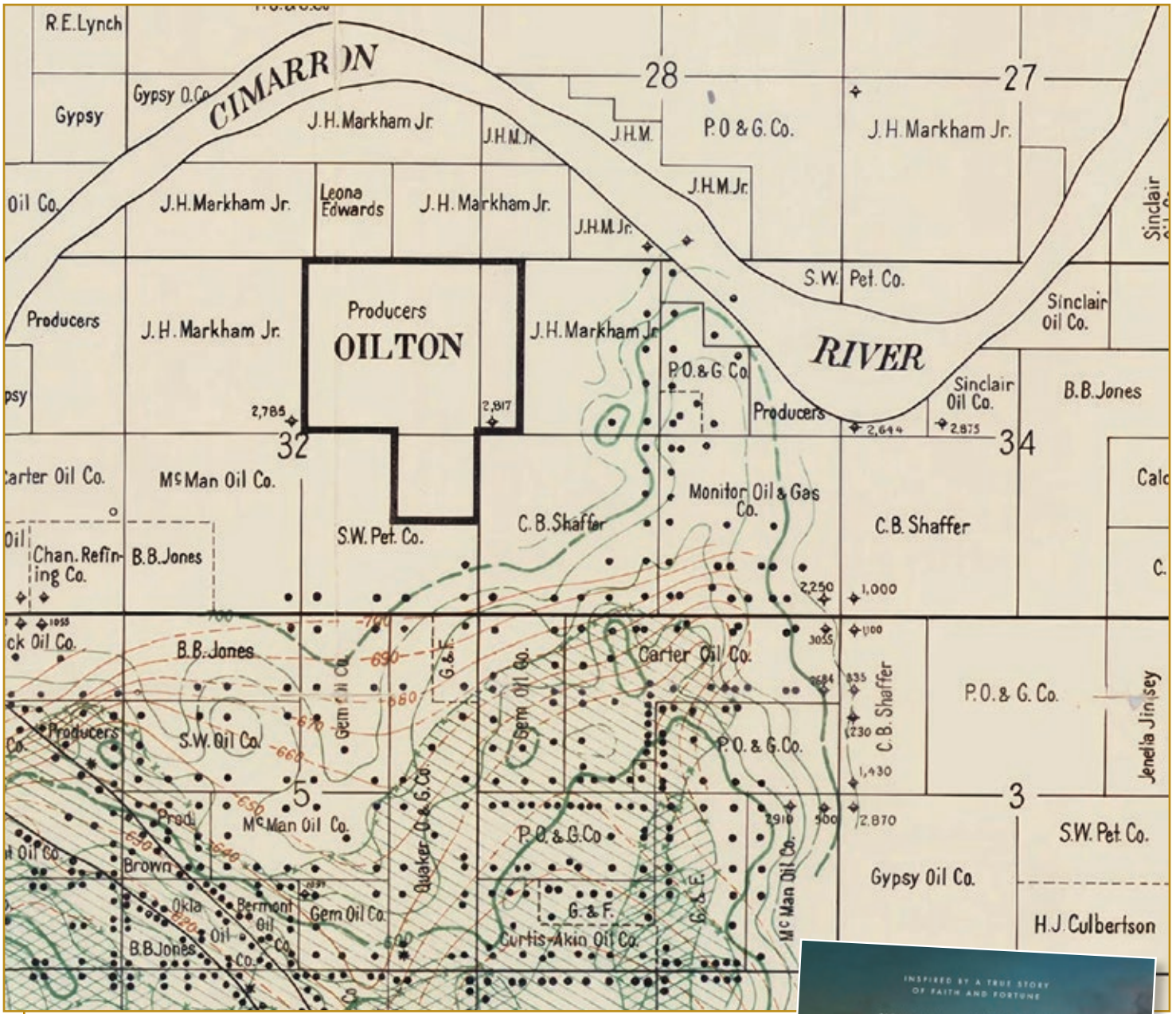
Cushing dominated the Sooner State's oil production for most of the 1910s when Oklahoma led the United States in crude oil output.

Legal Drama

It was also an era when Indian minors (and adults) were often swindled by court-appointed "grafter guardians." Joe Rector resigned as her guardian, and an Oklahoma court appointed a local white man, T. J. Porter, to handle her affairs. Sarah was lucky again, as Porter invested her money in a new home and the land to build it on, a family car, then real estate, rich farmland, mortgages and other profitable investments.

At 14, Sarah asked the court to appoint her father and Porter as co-guardians. A banker named Milton Young was named instead of her father, and then Porter's lawyer was found to have received kickbacks on her real estate transactions, which cost him his law license. She was subjected to intense attention by

Postcard titled, "In the Oilfields at Drumright, Okla.," with the cursive note "This makes Oklahoma famous." Jeff Spencer collection.



Above: Sarah Rector's allotment is in the southwest corner of the map, which shows numerous oil wells in the S/2 SW/4 of Section 5, labeled "B.B. Jones" for the operator. Green contours are Layton Sand structure in subsea depth, contour interval of 25 feet. Red contours are "on the water surface in the sand," contour interval of 10 feet. From "Geologic structure in the Cushing Oil and Gas Field, Oklahoma and its relation to the oil, gas, and water," by Carl H. Beal, 1917, U. S. Geological Survey Bulletin 658.

Right: Theatrical movie poster for "Sarah's Oil," Amazon MGM Studios. One review of the movie was subheadlined, "The Little Drilling Rig That Could."

newspapers across the country and received numerous requests for financial assistance as well as many marriage and investment proposals.

Her story drew the attention of W.E.B. Du Bois, the sociologist and civil rights activist who co-founded the National Association for the Advancement of Colored People. Under his leadership the NAACP investigated some disturbing claims about Sarah Rector's living conditions and the alleged mismanagement of her estate by her white guardian. The investigation found those claims to be mostly false; in fact, she, her family and her finances had been

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Above: Postcard titled "Sarah Rector farm on the Cimarron," courtesy the Oklahoma Historical Society.

Left: Sarah Rector with a nephew, published with permission of Debbie Brown.

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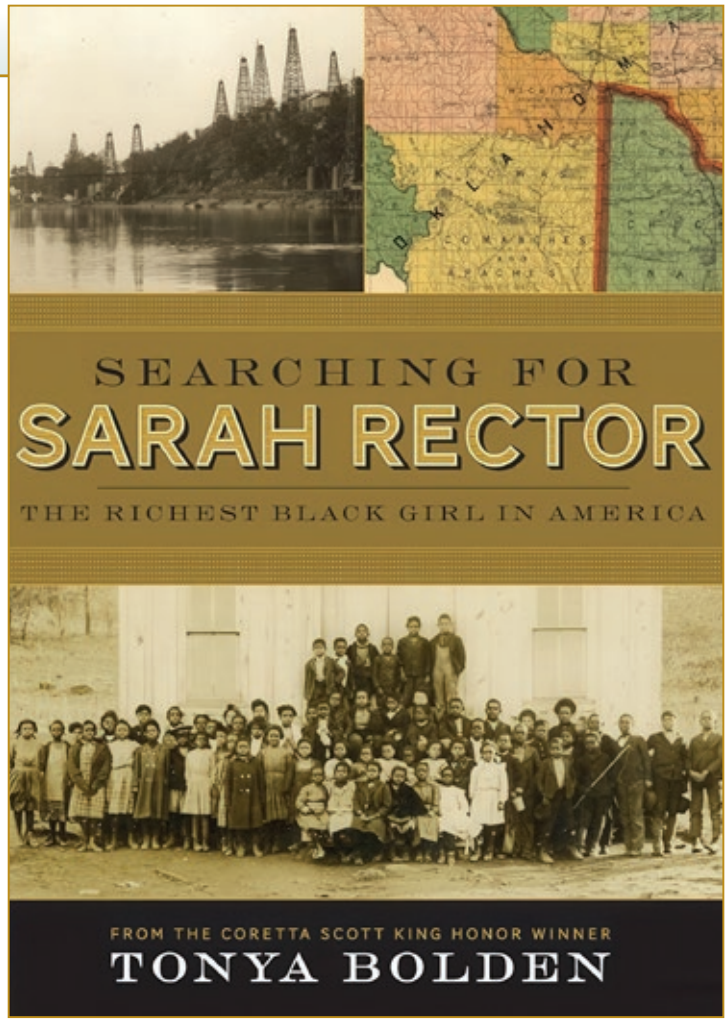
relatively well-cared for. However, her case drew attention to the broader vulnerability of black and Indian children with financial assets and prompted the later creation of the NAACP's Children's Department.

Sarah briefly attended the preparatory school at Tuskegee Institute in Alabama, where Booker T. Washington, an educator and proponent of self-help and education "as the path to Negro advancement," apparently took a personal interest in her education. After the Rector family moved to Kansas City, Missouri, she graduated from Lincoln High School there. As an adult, she was able to take control of her own fortune, and Sarah began to enjoy the privileges of great wealth in her new Kansas City home. She moved into the "Rector Mansion," a large stone foursquare home that is still standing. Kansas City's



Cover of "Searching for Sarah Rector: The Richest Black Girl in America," Abrams Books for Young Readers.

"first black millionairess" entertained African American celebrities like jazz greats Duke Ellington and Count Basie, as well as heavyweight boxing champions Jack Johnson and Joe Louis.

Searching for Sarah Rector

"Searching for Sarah Rector: The Richest Black Girl in America" is no ordinary children's book. Tonya Bolden's historical biography for children about ages 8 to 12, is deeply researched and lavishly illustrated with bibliographic references, vintage maps, historic photos and an index.

The book explores the creation of Indian Territory, the pioneer days of Oklahoma and its early 20th century oil boom, and the legal, economic and social challenges faced by blacks and Native Americans during the Jim Crow era. Bolden employed interviews with Sarah's descendants, as well as newspaper accounts, courthouse documents and census records, to painstakingly piece together her dramatic life and the story of her family and community.

"Searching" refers to a period in 1914 when Sarah was falsely said to be missing by the black newspaper Chicago Defender, which ran a story headlined, "RICHEST CHILD OF THE RACE MYSTERIOUSLY DISAPPEARS." She was at home in Oklahoma the whole time. "Searching" also refers to the absence of a diary or any other first-person accounts she might have left as a child. During the publicity frenzy after her wealth made Sarah a national cause célèbre, a Washington Post reporter went to her home for an interview. Apparently, "she refused to come out and see him but crawled under the bed."

Sarah's Oil

The film "Sarah's Oil" was released theatrically on Nov. 7, 2025, by Amazon MGM Studios. Directed by Cyrus Nowrasteh and starring Naya Desir-Johnson (as a plucky young Sarah), Zachary Levi, Sonequa Martin-Green, and Garret Dillahunt, it was inspired by the children's book by Tonya Bolden, who acted as a consultant for the film. Executive producers included power couple NFL quarterback Russell Wilson and Grammy-winning R&B entertainer Ciara.

The movie opens with an apt quote attributed to J. Paul Getty: "The meek shall inherit the earth but not the mineral rights."

Spoiler alert: "Sarah's Oil" varies from the book and the true story in a number of ways. It presumes that Sarah had a God-given faith that oil was under her allotment ("I heard it"), and it features her efforts to "find a partner to help me drill it out." It suggests she boldly struck a 50-50 "Texas handshake deal" with the charming driller, rather than her lease's one-eighth royalty. Her real guardianship story was tangled but the movie complicates it further with the driller – then a white woman associated (in real life) with the Oklahoma Commission of Charities and Corrections – acting in that capacity. The historical record doesn't support any of that, but faith, fortitude and an enduring friendship make for good drama.

Prairie Oil and Gas, the Midcontinent affiliate of Standard Oil of Indiana after the 1911 breakup of Standard Oil, later controlled the production and marketing of oil from Sarah's lease. The movie suggests that she met John D. Rockefeller himself, which is unlikely, since he retired to his New York estate before she was born.

Rated PG, "Sarah's Oil" was produced with the cooperation of Sarah's descendants, and the outdoor shooting was done mostly near Okmulgee, Okla. The exciting scenes of cable tool drilling with a standard-derrick, steam-powered wooden rig bring the viewer into the center of the action. The movie received mostly positive audience feedback, with praise for its dramatic intensity, swelling

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Matt Silverman is a consulting petroleum geologist based in Colorado. He's the editor of the Historical Highlights column in the Explorer, chair of AAPG's History of Petroleum Geology Special Interest Group, and past president of the Petroleum History Institute, which will hold its annual symposium in Bakersfield, Calif., April 16-18, 2026.

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score and faith elements. Reviewers favorably noted its pointed but family-friendly social commentary and "David and Goliath" sensibility.

Later Years

Sarah Rector married twice and had three boys and eight grandchildren. She left the Rector Mansion shortly after the Wall Street crash of 1929 and moved into a more modest home about a mile away. She continued to live comfortably, but sold (or lost through foreclosure) most of her Oklahoma real estate, including her allotment, in the early 1930s. One of her nieces remembered her recently as " … a party girl. She loved to party, entertain – and she did – but the flip side is she loved her family."

Sarah died of a stroke in 1967 at age 65 and was buried in the then racially segregated Blackjack Cemetery in Taft. The gravestone notes some of her family relationships but misstates her birth year and makes no mention of the oil discovery and vast royalty income that made her "the richest colored girl in America."

Above: Sarah Rector's house at 2000 E. 12th Street in Kansas City, Missouri. Smuckola photo reproduced under the Creative Commons Attribution-Share Alike 4.0 International license.

Left: Sarah Rector's grave, Photo by Cheryl Travis.

Acknowledgments

I thank Jeff Spencer for the vintage postcards and Ray Sorenson for both a review of this article and pointing me to a related contemporary story, that of Tommy Atkins. In "Ghosts of Crook County: An Oil Fortune, a Phantom Child, and the Fight for Indigenous Land," historian Russell Cobb recounts the convoluted saga of a Muscogee boy known as Tommy Atkins, whose death, or possible nonexistence, became the legal foundation for a powerful white oilman, Charles Page, to acquire his land in Creek County. Cobb reveals how multiple women claimed to be Tommy's mother, how court battles and impersonations proliferated, and ultimately argues that Tommy was likely a fabrication devised to facilitate a land-grab. On the USGS map accompanying this article, the Atkins allotments are labeled as Gem Oil Co. (owned by Page) in sections 4 and 5. Sarah and Tommy were "neighbors."

***Historical Highlights** is an EXPLORER series that focuses on the history of petroleum exploration and production. Topics broadly related to our work in the geosciences, the critical advances of science and technology, the key discoveries and the saints and sinners among our colleagues are all welcome. Narratives that illuminate the E&P process or its context in geopolitics and energy economics are encouraged. If you have such a story or know someone who does, please contact **Matt Silverman**, the series editor, at silverman_matthew@yahoo.com.*

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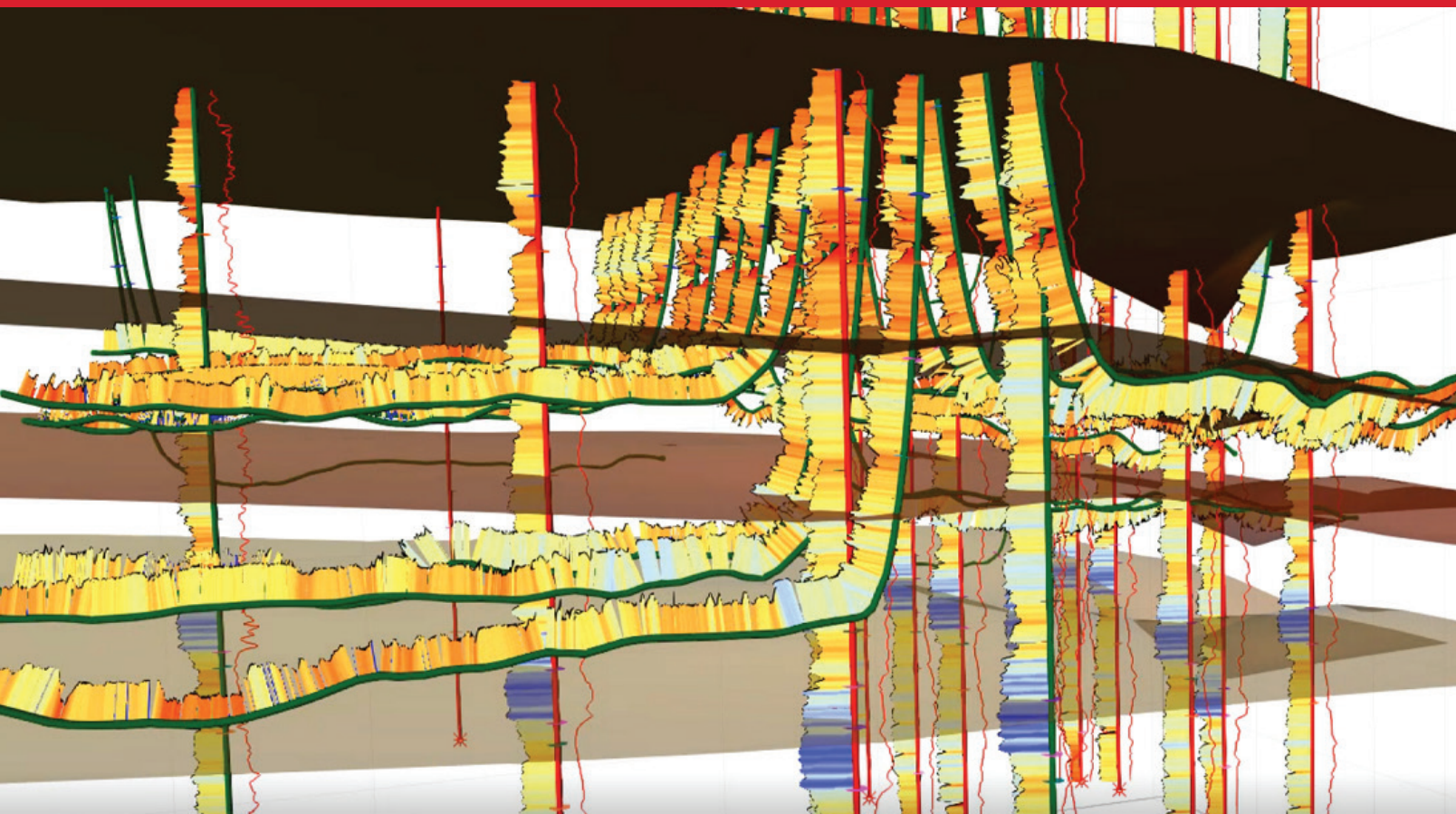


The Explorer's Mindset: What Is It?

The five traits that set successful explorers apart

By JONATHAN ROTZIEN

Cindy A. Yeilding coined the term "The Explorer's Mindset" in her 2002 AAPG Distinguished Lecture.

As Mark Shann would say, "You need to call it something to be able to define it," in his reference to "disruptive discoveries," like Zama, the discoveries that abruptly change the resource curves in relatively mature basins.

So how is "The Explorer's Mindset" defined?

It is five main traits that distinguish exceptionally successful explorers: Technical excellence. Creativity. Business acumen. Ability to tell a story. Grit, tenacity and grace.

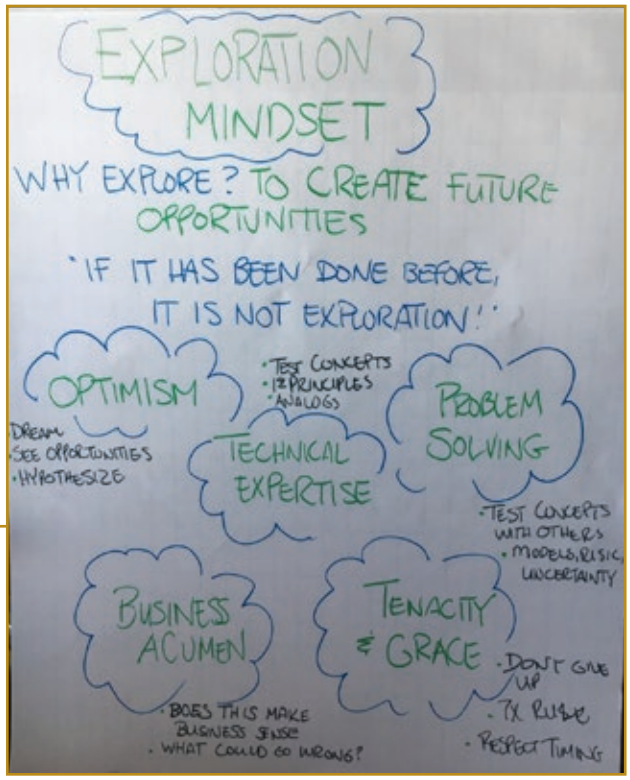
Technical Excellence

Let's start with technical excellence. You need to be really good at your job. Not only do you need to understand the petroleum system – what makes a winning play (and have abundant analogues from which to draw inspiration) – but you also need to deftly navigate the available software of the generation. You need to be able to show the scientific evidence for your prospect, and sometimes this comes down to knowing which attribute to use. Heather Bedle (a frequent Geophysical Corner contributor) is well known for her ability to use software and attributes to be able to show the geology so clearly in her subsurface examples. I just watched her present this morning on the latest seismic attributes to our "Conjugate Basins, Tectonics and Hydrocarbons Consortium" at University of Houston. The attributes she chose make the geology so obvious to the audience, which is convincing. No doubt, this expertise has taken decades of mastery using software and understanding which attributes will best show the petroleum elements the best, for instance, sand in a deepwater channel belt.

Creativity

In my book, "The Explorer's Mindset: Lessons in Leadership in Applied Geoscience and the Energy Industry," so many interviews emphasize the importance of creativity in the geosciences. Creativity is important because subsurface data can often be interpreted using more than one scenario, putting a premium on the explorer's ability to think broadly and effectively account for different interpretations. This ability is critical because, when the well comes in, and it wasn't the most likely scenario, but rather the second or third, management will understand that you communicated these other scenarios pre-drill. Again, much of our data in geoscience can be interpreted in multiple ways. The solutions are non-unique. Just ask anyone who has worked

"Your job is to see opportunities that others don't see, and this can often be contentious. You're annoying, you're a dreamer and there are a million reasons people think you should halt. If they're telling you to get back in your box, you're probably doing your job!" – Cindy A. Yeilding



Left: The original drawing and artwork of The Exploration Mindset by Cindy A. Yeilding at the inaugural meeting of the Houston Explorers Club, February 2019 at the St. Regis Hotel. Right: Diagram shows the modern interpretation of The Explorer's Mindset described in this article.

potential fields for their career. Creativity is not easily taught, nor is it easily learned, but it can be developed to steer the explorer away from sheepy thinking – better known as "group think" – that disincentivizes personal responsibility. This is a topic for another post.

Business Acumen

If the prospect success case won't increase free cash flow – the main factor that increases value for any company regardless of industry – the well will not get drilled. Further, the overall business plan must satisfy the traditional triad: it must be technically possible, economically feasible (that's where FCF comes in), and societally acceptable.

Being good at business means that a lot of subsurface experts must exercise new muscles – those of finance, valuation, accounting and modeling. Marlan Downey said it best: "Geology is a science; exploration is a business."

Ability to Tell a Story

At first, this one is tough to describe and is often misinterpreted. Most explorers often go straight to "salesmanship," but this can be misleading. This trait of successful explorers is best described as the ability to bring people along in the story of the prospect, to show without a lot of hoopla and drama the pluses, minuses, aspects, deficiencies, uncertainties. To make the audience of funders or senior management comfortable with delivering capital in the range of $1 million, $10 million or $100 million on an exploration well.

And when an explorer first tells this story to a potential group of financers, he or she might get a, "No way!" So they ask again, in a different way. Or, they fix some of the problems associated with the prospect, working and working and working on one or two of the key risks flagged by the initial group. The explorer tells his story again. And maybe a few more times. Sometimes it takes seven times to get to a "Yes," but it can take even more tries. Like, hundreds of tries in the case of Liza.

Often, this doesn't mean that your prospect is bad. It just means it didn't fit the investment criteria of your capital providers. So keep trying, but not doing it the same way over and over again. Get creative with your approach.

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Jonathan Rotzien is President of Basin Dynamics. He has worked in most of the world's petroleum producing regions and specializes in leading corporate projects, research programs and professional training. In addition to his business, he serves in faculty and research roles at University of Houston, University of Texas at Austin, South Dakota Mines and The Drifters Research Group with the Andalusian Earth Sciences Institute. His current industry appointments include Hot Energy Group (Leoben, Austria) and Subsurface Consultants and Associates (Houston, United States). With more than 100 publications including short courses, his recent works include Deepwater Sedimentary Systems: Science, Discovery and Applications, created by 62 authors from 20 countries, and the second edition of The Explorer's Mindset: Lessons in Leadership in Applied Geoscience and the Energy Industry. He holds a bachelor's from Colorado College and a doctorate from Stanford University.

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Grit, Tenacity, Grace

Which brings me to the final trait described by Cindy in her 2002 AAPG Distinguished Lecture: grit and tenacity, paired with grace.

These three traits are often glamorized, but they don't need to be. Many of the most successful explorers are just good at showing up, day after day, year after year. Many weren't brilliant at the start. But they took time to hone their exploration skills, getting better and improving, learning from mistakes and loving the process of oil and gas finding as they did. Over time, this gave them an edge over other explorers to see possibilities others don't see, as Cindy mentioned. This is what grit, tenacity and grace look like over the long-term, and how many great explorers have drilled success after success after success.

Cindy A. Yeilding gave the inaugural lecture at the Houston Explorers Club in 2019 at the St. Regis Hotel in Houston on "The Explorer's Mindset," a topic that was first introduced at a very broad scale as an AAPG Distinguished Lecture. It is still very much in vogue today. In fact, even more so. The latest generation of oil and gas finders (that is, recent graduates) has not been adequately coached in the Explorer's Mindset. They have been shown how to mine oil and gas through hydraulic fracturing – a relatively low-risk, and in some cases, high-profit, business.

But capital has also been incinerated during the Shale Revolution. Just look at what happened to public and private companies at that time and all of the consolidation and bankruptcies that ensued. Not all unconventional-focused companies will be as successful as Dunn's CrownRock.

The Magic of Naysaying

So now you know the five main traits defining the Explorer's Mindset. How will you apply them and demonstrate them to your teams? Don't you think it's time we started thinking outside the box, using the Explorer's Mindset, to find the next big game-changing discoveries?

Cindy offers a poignant, pragmatic and inspiring conclusion: "It's magic when people say, 'That will never happen,' because explorers like me hear 'great opportunity' in those words. An explorer's role is to create value where others don't, or where others think it is not possible. So, explorers typically receive responses to their new ideas, like:

"That technology will never work at scale."

"It might work but it will never make money."

Or the ever-popular: "Whatcha' been smoking?"

As a lifelong explorer and opportunity generator, I see exploration as a search for potential value from the artful application of new concepts and ideas. What do explorers do? We challenge dogma and biases to create new opportunities. We underpin our work with excellent scientific principles and solid economics. We characterize risks and uncertainties. We also fail – a lot! A successful explorer will learn from these experiences, integrate them into her exploration toolkit and regroup."

This is the first of a new regular series on The Explorer's Mindset prepared for AAPG Explorer. This column is based on the second edition of the book, The Explorer's Mindset: Lessons in Leadership in Applied Geoscience and the Energy Industry. In the installments to follow, we'll be looking at the traits of successful explorers, their leadership qualities and what has enabled them to make game-changing discoveries.

AAPG Foundation Launches $25 Million Campaign to Shore Up Geoscience's Future

First capital drive in 15+ years targets research, education, outreach and recognition amid a strained talent pipeline.

By VERN STEFANIC, AAPG Foundation Communications

Rising threats to the future of both the geosciences and the profession have been undeniable throughout the past year – and for months, the AAPG Foundation has hinted "something big" was about to be revealed to urgently address that crisis.

Today, the revelation begins.

In an ambitious move designed specifically for this "critical and defining moment" of history, the AAPG Foundation is launching a capital fund drive for 2026 that seeks to raise $25 million.

The campaign's goal is to raise funds that will "strengthen geoscience research, geoscience education and talent development for years to come," said Foundation Chair Jim McGhay.

"The geosciences have never been a field that retreats in the face of challenge," McGhay said. "Our history demonstrates that when the community aligns around a shared need, transformative progress is possible.

"Today, we find ourselves in such a moment again."

It is the Foundation's first capital campaign in more than 15 years.

Strategies and details for this effort have been considered unofficially for several years; current Foundation Executive Director Rick Fritz first suggested the need for a capital campaign when he was president of AAPG (2020-21), and has continued to identify the needs and develop a plan over the past decade, first as a consultant and now in his leadership position.

But for all campaigns, timing is everything – and rapidly changing conditions for the profession and within the industry has made this time the perfect time. This capital campaign will now be promoted with urgency; clearly, its timing is intentional and, according to the Foundation Trustees, necessary.

"Geoscience stands at an inflection point, and the tension is not abstract," said Foundation Trustee Scott Cameron. "We see the signs everywhere – the future of geosciences and of our profession have reached a critical point, and the time for action is now."

Data that inspired the Trustees' decision to launch the campaign can be found in the headlines that dominated the past year.

"University geology and geoscience programs are contracting, graduate enrollments are declining and research funding, particularly for applied energy

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Jim McGhay

Rick Fritz

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The monthly list above of AAPG Foundation contributions is based on information provided by the AAPG Foundation office.

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geoscience, is no longer keeping pace with the challenges we face," Cameron said.

He also cited "the shrinking number of faculty positions, the reduced experiential training available to students, and the widening distance between academia and the applied demands of industry" as dramatic concerns.

"The result is a pipeline under strain," Cameron noted. "Fewer students, fewer research opportunities and fewer emerging scientists prepared to tackle the subsurface questions that underpin energy security, environmental stewardship and technological innovation."

The Time is Now

The good news is, the current challenging dynamics facing the profession are what the Foundation's campaign specifically seeks to address.

The better news: The Foundation has already developed innovative strategies and creative approaches that, once funded, could rescue and reshape the entire profession.

At the core of those strategies lies

Autumn Williams exploring the Picacho Mountains

support for the "Foundation pillars," which, with funds from the capital campaign, will be in place far into the future to ensure geoscience excellence.

Those pillars are:

- Research: This includes a new, innovative program designed specifically to address the critical gap in funding for applied research. (See accompanying story.)
- Education: This includes support for several geoscience education initiatives, including the recently developed Foundation Field Camp Scholarship program, as well as Grants-in-Aid and the Military Veterans Scholarship Program.
- Outreach: This includes support for proposals that often involve programs that impact the general public, such as work with American Geosciences Institute on Earth Science Week, the recently re-defined Scouting initiative and the popular Geoscientists Without Borders.
- Awards/recognition: Support for ongoing efforts to reward and recognize excellence in the Association, the profession and the industry, and to promote those achievements to the public.

Intentionally, the campaign goals are to have the support needed to "reinforce essential programs that develop future geoscientists at every stage of their journey," McGhay said.

"All of our pillars are vital components of a healthy academic and professional ecosystem, and are worthy of our support," McGhay said. "Together, these initiatives represent a continuum of support that begins with early exposure to geoscience and extends through advanced research and professional readiness."

The Enduring Importance

The Foundation's Capital Campaign Committee will be headed by geoscientists who have demonstrated decades of loyal commitment to the Foundation via their gifts, volunteering and leadership – the chairs are Pam and Dan Billman, both with Billman Geologic Consultants in Houston, Pa.

Pam Billman has been a member of the Foundation Trustee Associates since 2017. Dan Billman is a Foundation Member of the Corporation; is secretary-treasurer of the TAs for 2023-26; a member of the AAPG House of Delegates for more than 20 years; and former president of the AAPG Eastern Section (2007-08).

Additional Committee members, leadership and details about the campaign will be announced in coming weeks, McGhay noted, but "the call to leadership cannot wait.

"Our mission is critical, to support, indeed, to help ensure the very future of our profession and science," he added. "We know that we have set an ambitious goal, but that's because today is unlike any other time in our history.

"The pressures on geoscience are real," he said, "but so too are the opportunities that await if we respond with focus, generosity and resolve.

"I invite you – colleagues, partners, mentors and friends – to stand with us," he said. "Let's face this challenge, and lead together toward the unknown possibilities."

McGhay appealed to "veteran" geologists to "remember the key moments of your education and professional journey, and then realize what your support could do to enable for the current and future generation of geoscientists.

"Let's reaffirm the enduring importance of the geosciences and invest today in the discoveries, innovations and people who will carry this field forward," he said.

"Our work begins now, but our impact can echo far into the future."

For more information on how to advance the energy and related geosciences, please contact Heather Hodges at the AAPG Foundation, at foundation@aapg.org, or visit the website at foundation.aapg.org.

Announcing the Creation of AEGIS

Among the new and, certainly, most ambitious ad innovative aspects of the AAPG Foundation's capital campaign is creation of AEGIS – the fund for Advanced Energy Geoscience Innovation and Support.

The initiative was created to address a critical gap facing the profession – the erosion of applied research capacity at U.S. universities, just as the energy industry is confronting increasingly complex subsurface challenges.

Through AEGIS, the Foundation will fund graduate-level research projects that:

- Focus on real-world challenges and problems.
- Foster stronger ties between industry and academia.
- Expose students to the practical skills and insights that define successful careers in energy geoscience.

In this year's pilot phase, the Foundation expects to award up to seven grants of $100,000, paid over two years, to advance research in areas such as resource exploration, advance reservoir characterization, enhanced oil recovery, sustainable energy development, or environmental topics related to oil and gas production.

"AEGIS is an exciting part of our plans due to the capital campaign," noted AAPG Foundation Chair Jim McGhay.

"These grants are structured to support not only scientific innovation," he added, "but also the graduate students whose work – and futures – depend on sustained mentorship, rigorous inquiry and access to meaningful support for applied research."

AAPG Explorer

Voices, Vision, and Community

The rise of Europe's young geoscience leaders

By MARCELLA CILIA

It is a period of significant change in the energy sector, and the end of 2025 marked an important period of transition as well for the AAPG Europe Young Professionals, with refreshed leadership structures in England and Wales and strengthened coordination at the European level.

The AAPG Europe Young Professionals Committee supports students and early-career geoscientists across the continent by fostering professional development, technical learning, and peer connection. Within this broader European framework, UK-based members representing England and Wales play an active role in shaping and delivering initiatives that respond to local needs while remaining closely aligned with a wider European vision.

As the energy landscape evolves, the demand for adaptable geoscientists with interdisciplinary skills continues to grow. At the same time, early-career professionals face increasing uncertainty around career pathways, required competencies, and long-term opportunities within the geosciences.

The renewed alignment within Europe's AAPG YP community is intended to support greater continuity across regions, improve collaboration, and ensure that local initiatives contribute meaningfully to a shared Europe-wide strategy. For UK-based YPs, it also provides clearer pathways for engagement beyond national boundaries, connecting members with peers, mentors, and industry partners across Europe.

Riding the Wave of Change

How can early-career geoscientists adapt to a rapidly developing energy ecosystem? How

From left: Harneil Ratajczak, Liam O'Flynn, Marcella Cilia, Gerardo Gaitan, Yasmin Roberts, Vitaly Ivanov.

should skills gaps within the geosciences be addressed? And what role do industry, professional societies, and academic institutions play in supporting the next generation?

These questions sit at the heart of why the YP community exists. Traditional career routes are shifting, the public conversation around geoscience is evolving, and the expectations placed upon geoscientists now span more disciplines and technologies than ever before.

Periods of change often create opportunities for new approaches and collaboration. In response to this, UK-based members of the AAPG Europe YP Committee have focused on strengthening the fabric of their regional community. Over recent months, this has involved bringing together students, early-career professionals, and industry representatives through a range of activities designed to encourage skills development, informed discussion, and professional connection across England, Wales, and neighboring regions.

This approach reflects an understanding that the energy transition is not a single-discipline challenge. Addressing it effectively requires collaboration across geoscience, engineering, data science, environmental studies, and policy, alongside engagement with a diverse range of organizations and perspectives.

Geoscience knowledge and technical expertise remain fundamental to enabling a sustainable energy transition. However, knowledge alone is insufficient. Effective collaboration, public and political trust, and clearer professional pathways are also required to support those entering the field today.

Building Momentum Under New UK and European Leadership

Leadership changes implemented toward the end of 2025 represent a period of organizational transition for the AAPG Europe YP Committee. With renewed leadership in England and Wales, and closer alignment with a coordinated Europe-wide team, the organization is working toward a more consistent and strategic approach to its activities.

A central principle guiding this transition is the idea that leadership within a volunteer-led YP community is rooted in continuity rather than authority. Roles evolve as careers progress, and new volunteers step forward at different stages of their professional journeys. The emphasis is to build upon existing foundations rather than resetting direction.

At the European level, leadership has focused on improving cross-border collaboration and supporting regional committees through more consistent and formalized processes for sponsorship and finances, governance, and strategic engagement. This continental perspective helps ensure that opportunities are not confined to local networks, enabling UK-based YPs to connect with peers and mentors across Europe.

At a regional level, this renewed direction is beginning to influence activity on the ground. The England and Wales committees are rebuilding their event calendars to include technically relevant and forward-looking talks, interdisciplinary skills workshops spanning soft skills, geoscience communication and hands-on software training, informal networking sessions, and collaborative field-based activities. Partnerships with universities, energy companies, geological societies, and professional organisations continue to develop, alongside renewed focus and support for Wales – a region often underrepresented within national professional networks.

While engagement levels vary across regions, there are early indications of increased member participation, particularly where events offer clear professional development value and opportunities for meaningful interaction.

Defining Success for the Next Generation

Success within the AAPG Europe YP Committee can be measured in many ways: membership numbers, event attendance, sponsorship levels, or the scale of initiatives delivered. These indicators remain important. However, they capture only part of the picture.

As a YP attendee at a technical event once put it, "Sometimes the most meaningful outcomes aren't the ones you can measure immediately … they're the conversations, the confidence, and the sense that you're not navigating your career alone."

Within the AAPG Europe Young Professionals network, success is often reflected in less tangible outcomes.

It might be a student who finds his first industry mentor. A young professional discovering a new technical interest. A doctoral candidate connecting with peers across Europe where she once felt isolated. A room full of early-career geoscientists debating the future of their field with confidence and curiosity.

Rather than a fixed destination, success is often reflected in the longer-term impact of relationships, professional confidence, and shared learning that continues long after individual events.

At the European level, discussions are also underway with colleagues in countries including Hungary, Azerbaijan, and Norway to establish additional YP chapters, extending the reach of the network and sharing lessons learned from the UK experience.

Why it Matters, and How You Can Be Involved

A forward-looking perspective is essential within a YP community. The challenges facing the geoscience community increasingly highlight the importance of shared knowledge, professional resilience, and networks that support early-career geoscientists as they develop confidence and leadership capability.

In practice, the value of the YP community

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Marcella Cilia is a geoscientist with a multidisciplinary background that bridges academic research, applied industry work, and technology development. She currently serves as president of AAPG Europe Young Professionals, representing early-career geoscientists across the region and helping to drive professional development and community engagement. Cilia studied geology and physical geography at the University of Birmingham. Prior to that, she undertook geophysics research with the U.S. Geological Survey through a gap-year scholarship, contributing to peer-reviewed scientific publications. She co-founded a start-up that develops both hardware and software solutions for the energy sector. Cilia has also hosted episodes of the AAPG Energy Insights Podcast, exploring topics such as sustainable development and the future role of geoscience in the energy industry.

Pipeline of 2026 Events for AAPG Europe Young Professionals

As we look ahead, the England and Wales committees aim to structure a program for 2026 that demonstrates sustained activity across the year, spanning student outreach, technical engagement, skills development, applied learning, and a flagship conference that serves as a key touchpoint within the Young Professionals calendar. Dates are still being finalized, the general schedule of events is as follows:

Early 2026: Building Awareness and Outreach

- Europe-wide Energy Careers Event (virtual): A pan-European careers event connecting university students with industry professionals across the energy and geoscience sectors
- University Energy Careers Event – Cardiff University (student outreach): An in-person careers and skills-focused event supporting student engagement in Wales

Early 2026: Technical Foundations

- Energy Storage technical talk: A technical session exploring subsurface energy storage concepts and applications within the energy transition
- Drone Geo-consulting technical talk: A focused talk highlighting the use of drones and remote sensing in modern geoscience and consulting workflows
- Hands-on Subsurface Software Training: Practical, in-person training designed to strengthen applied subsurface and digital skills for early-career geoscientists

Mid/Late June 2026: Flagship Event

- NextGen Geo – Flagship Young Professionals event: A two-day flagship conference bringing together students, early-career professionals, and industry specialists for technical and soft skill sessions, interdisciplinary workshops, and networking. Positioned as the cornerstone event of the Young Professionals calendar.

Spring 2026: Skills, Communication and Community

- Exploring Geoscience and Geo-communication (interdisciplinary skills workshop): A workshop focused on soft skills, communication, and effective storytelling in geoscience
- Core Workshop (in person)
- Energy on Draft (joint with GESGB) – every quarter: An informal networking evening designed to strengthen cross-disciplinary and cross-organisation connections

Late Spring 2026: Applied Learning and Engagement

- Geo-Engines technical talk: A technical session exploring innovative geoscience applications and emerging technologies
- Fieldtrip to an Archaeological Site: A collaborative field-based event highlighting interdisciplinary links between geoscience, heritage, and applied field skills

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lies not only in its activities, but in how its members learn from one another. By remaining open, collaborative and adaptable, early-career geoscientists are better positioned to navigate uncertainty with greater confidence and purpose.

The focus of the AAPG Europe YP Committee is to support this journey by providing platforms for connection, learning and engagement that help early-career geoscientists move forward, even as the path continues to change.

Stay Connected

If you are interested in any collaborations, you can find us on LinkedIn (London AAPG YP), or subscribe to our mailing list by emailing londonaapgyp@gmail.com to receive updates on upcoming events, training opportunities, and community activities.

Why Join AAPG?

Membership opens the door to a global network of geoscientists, technical resources, mentoring pathways, leadership roles, and a community committed to supporting the next generation. Whether you are a student, recent graduate, or early-career professional, AAPG offers platforms to learn, contribute, and grow – and to help shape the future of our field.

Positioning DPA for the Next Chapter

Bylaw updates, new programs and renewed outreach aim to strengthen relevance and growth in a changing industry.

By JANET BRENIZER, DPA President

The DPA Executive Committee has been working hard to update our bylaws to allow the Division of Professional Affairs to be a more flexible and relevant organization as we continue on in this new age of our industry. While few people are ever excited about large updates to organizational rules and structure, this is an important task to set our Division up for greater success in the future. We're streamlining the processes of governing the DPA to better reflect the realities of our Division and are rolling out changes to make it easier to join and participate in DPA activities.

This has been a time-consuming but necessary process to allow our organization to have the flexibility to begin growing again. I will give more specifics once everything is approved and finalized, but there are some exciting developments in store.

We are also working on rolling out new opportunities for outreach and growth. The new year will bring some exciting new programs as we continue to roll out educational opportunities that focus on professional development, ethics, and skill development for the professional energy geoscientists of the future. We are also in the opening stages of planning our events at IMAGE. Volunteering to help out with the annual meeting is a great gateway into helping to grow, both organizationally and personally. I got my start in DPA leadership because I was looking for ways to grow our membership among the (ahem!) … less seasoned geologists, but that is not as funny a story in the telling as it was in the experience, even if it is an important one.

Of course, getting new members in and retaining existing members requires us to provide value to our members. The DPA leadership continues to work on enhancing the value of certification as a tool to demonstrate an additional level of professional and scientific excellence to the business community. We are expanding efforts to connect experienced professionals with newer geologists, both through more traditional conferences and seminars and by expanding on the mentoring programs that have been successful.

I look forward to a year filled with opportunities in 2026!

AAPG Division of Professional Affairs

We are expanding efforts to connect experienced professionals with newer geologists, both through more traditional conferences and seminars and by expanding on the mentoring programs that have been successful.

Make the Big Time Where We Are

From petroleum to full subsurface: common ground to sustain AAPG into the future

By TOM WILKER

As a senior in high school, I was introduced and recruited by a successful college football coach. His name was Frosty Westering and he coached at Pacific Lutheran University. Coach Westering led his team to three National Association of Intercollegiate Athletic Division II championships and one NCAA Division III championship. His teams also made it to the national championship game four other times and the national playoffs 20 times. His career coaching record was an impressive 305-96-7 (75.6 winning percentage) and his teams never had a losing record. He was inducted into the College Football Hall of Fame in 2005 and is one of only 14 college football coaches to win more than 300 games, but what made Coach Westering more than just a coach was the life philosophy he shared with all his players.

Coach Westering authored a book and its title aptly describes his life philosophy, Make the Big Time Where You Are. I wonder if this title doesn't also describe what the AAPG should seek to achieve. The best way I know to articulate his philosophy is to tell one of his stories.

Made to Order Perfectly

Frosty and his wife were vacationing and happened upon a small diner for breakfast after their morning walk upon the beach. They placed their order and when the food arrived, he could tell it was perfect. He had ordered "extra-crisp bacon, eggs sunny side up, and toastie toast." He called the waitress over and told her he wanted to tip the cook. The waitress awkwardly replied that no one tips the cook, only the waitress. He replied that she would also be tipped but he also wanted to meet and tip the cook. After some more good-natured back and forth, the cook appeared at his table and they shared a

> ***The AAPG knows how to make the big time where we are. We have a road map to our state of heart, and we can lay down our factional swords and lean into our common focus.***

discussion. The cook said, "Frosty, I want you to know you've made my day. No, you have made my week; actually, you've made my job. I take real pride in preparing every order just as it's desired – every little request. I get paid a good wage, but I have never had anyone, let alone a customer, tell me I was doing a good job. This tip from you is really special. I am going to frame it."

Frosty replied, "You're a real pro, you take pride in your profession. Whether others recognize it or not, continue to give it your best shot and enjoy the trip – 'make the big time' where you are."

Unsung Energy-Security Providers

We, as petroleum geologists, are not too unlike this cook. We work in the background to provide energy security to the world. Rarely are we recognized for our efforts, but we love what we do and we do it with pride. We love the hunt to find something new, to discover it, and to produce it. We love the creativity and knowledge our scientific career requires.

Yet, our industry is vilified. It is characterized as "capitalistic" and as damaging to the environment and our climate. This is especially hurtful because we became geologists because we love the Earth and earth science. We are forced to decide between defending our profession and informing others of how important our jobs are to their health and standard of living, or to avoid confrontation with activists and remain quiet and under the radar. This effectively creates an existential challenge for us professionally and for the AAPG. Some will say we should be loud and proud advocates; others will say, "Let's just focus on the science and stay out of politics."

Going on the Offensive?

We know we are a shrinking member organization, but a proud professional society. We want to protect and project our legacy and to earn a tip like the cook from society for good petroleum service. To be relevant and sustained, however, we must ask ourselves if we need to open our aperture to allow our knowledge to inform other subsurface geology applications.

Instead of being a smaller, shrinking organization, should we fight back?

We have already been doing this with our divisions for years, especially the Energy Minerals Division and Division of Environmental Geosciences. These divisions, publications, and others bring content to our members. We see high turnouts for webinars on geothermal and orphan wells. We are doing what we need to do, yet should we do this with more gusto in an effort to grow our membership and resilience?

Petroleum will be a constant and a foundation no matter what, but it can also be a transferable learning vehicle.

According to American Geosciences Institute data, approximately 3,500 students graduate with a geoscience degree in the United States each year and only about 5 percent go on to careers in petroleum or mining. Sixty-five percent work in environmental areas and 20 percent work in engineering related fields. Five percent of 3,500 graduates is only 175 prospective members. This pipeline of prospective members, although U.S.-only data, is not sufficient to sustain the AAPG long-term. Should we leverage our divisions to target the other 95 percent of geoscience graduates?

Planting Our Goalpost

These and other financial considerations are dilemmas with which the AAPG leadership have been wrestling in recent months. The conversations are real and so are the sensitivities. The good news is that we have found sustaining common ground in our three-year strategy. The Executive Committee, with the assistance of the Advisory Council, landed on the following visions statement, a statement that defines how we measure success:

We deliver relevant and useful quality content and data for professional enrichment, learning, and research, while advocating and advancing the economic application of the science of geology, especially petroleum, subsurface, energy, and environmental geology. Additionally, we connect our global members with other members, companies, and academia to foster professional success.

This vision statement defines us as being focused on the economic application of the science of geology, yet it includes petroleum, subsurface, energy, and environmental disciplines. It also distinguishes us from other professional societies.

Conclusion

With this directive, the AAPG knows how to make the big time where we are. We have a road map to our state of heart, and we can lay down our factional swords and lean into our common focus. We don't have to worry about whether we are petroleum geoscientists or geothermal geoscientists or carbon sequestration geoscientists. We are all about the economic application of subsurface geology. We can help each other to deliver the energy security our world needs, and I am profoundly confident the AAPG members can agree we need to be the best organization we can be.

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STAFF

Managing Editor
Brian Ervin
bervin@aapg.org

Graphic Design
Matt Randolph
mrandolph@aapg.org

Advertising Contact
Cait Williams
+1 (330) 317-3173
cwilliams@aapg.org

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