

Oil and Gas Investor

**CONTINENTAL
RESOURCES'**

Harold Hamm

and

Bill Berry

Talk

**CARBON
CAPTURE**

SPECIAL REPORT

**War Brings
Uncertainty to
Energy Markets**

**As the World Turns,
Haynesville Churns**

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CONTINENTAL RESOURCES' FORAY INTO CARBON CAPTURE

The Williston Basin has the ideal properties for long-term carbon storage, Continental Resources Inc. founder Harold Hamm said at an event in Fargo, N.D., announcing the shale producer's first carbon capture project.

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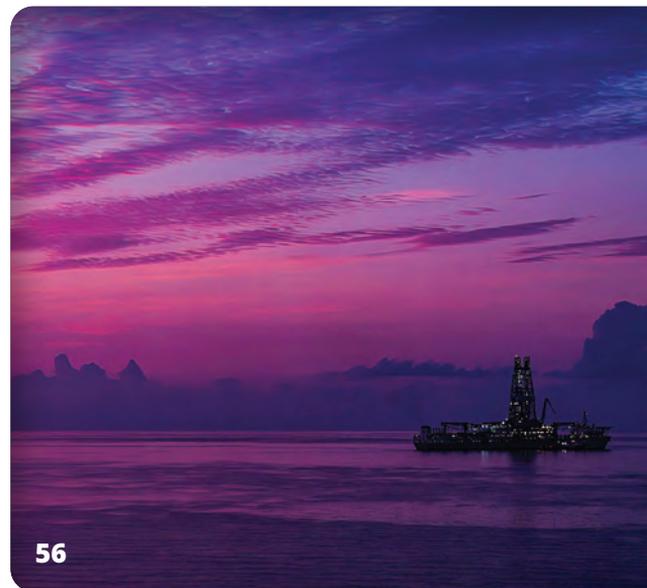
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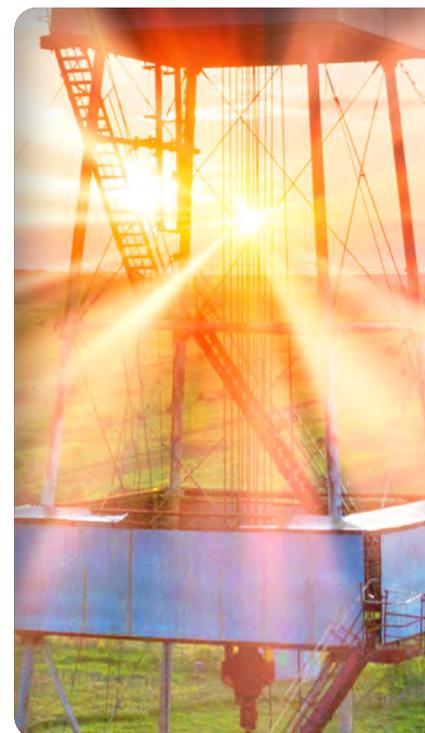
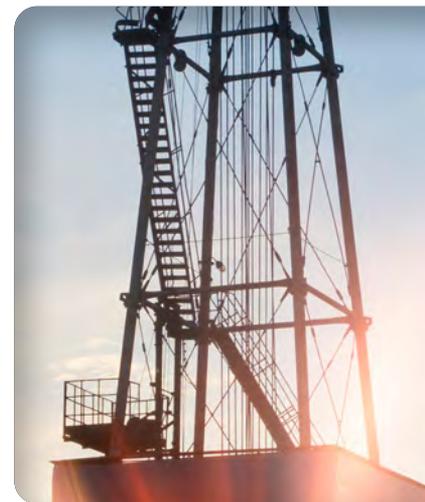


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ABOUT THE COVER: Continental Resources Inc. unveiled a \$250 million investment in a carbon capture and sequestration project in the Williston Basin that its partners say, once in operation, will be the largest such carbon sequestration project in the world. So what brought Harold Hamm and Bill Berry into the world of carbon capture? Hart Energy's Brian Walzel traveled to Fargo, N.D., for the grand announcement and got the inside scoop from Hamm and Berry, as well as their partners at Summit Carbon Solutions and North Dakota Gov. Doug Burgum.



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4 THINGS I THINK THAT I THINK

NO ONE
ASKED ME,
BUT...



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When I sat down to write this column I kept getting stymied by the vast number of potential subjects running through my mind. With war in Ukraine, infrastructure constraints hampering the ramp up of natural gas production, LNG cargo ships in the Gulf of Mexico waiting for directions, my own direction of this column has also been in-progress but “without orders.”

I never did figure out where I wanted to go. So how about I go to all of it.

1. There’s a lot of hype and excitement about bitcoin these days. Sure, it seems like a good way to reuse associated gas to cut down flaring. Now is probably a good time to embrace it. However, for the long term, what happens when governments start to regulate cryptocurrency, and they will.

History tells us world leaders—from the elected to dictators—aren’t going to let monetary systems fly around unchecked for very long. The biggest draw to crypto is that it is a Libertarian’s dream monetary system, free of regulation by central banks. Does the interest still survive in, say, 10 years from now if it’s just another way to hold money?

There’s a lot of factors still to be determined, but my guess is crypto currency will see plenty of corruption, separation into haves and have-nots, and thus political upheaval and attempts at government intervention as time drags on. It will still have to prove it can survive those moments before it can be safely regarded as “the future of money.”

2. Then there’s the current embrace, er, scapegoating, of U.S. fossil fuel production as a means to lower gasoline prices at the pump and heating oil prices at home. Playing the energy sector like a yo-yo to win over voters will only do more harm than good to those in power, especially in a hotly contested election season.

We’ll be in Pittsburgh this summer for the DUG East Conference, and the conversations are sure to center

on the lack of infrastructure to unleash the vast natural gas resource in the region. I probably don’t have to tell anyone reading this that infrastructure buildout is something that can’t be addressed when needed. We need to always be prepared. We’re not.

3. On a non-energy-related note, I just saw an article on LinkedIn about the plight of women of a certain age in the workplace these days. First, that’s not new. Second, it’s not just women. Although, I’m sure older women have a much harder time battling ageism than men do.

This might get a few “OK, Boomer” comments. For the record I’m about as Gen X-er as you can get, so be accurate with your criticism. The business environment today celebrates youth, up-and-comers and disrupters. My own company celebrates a “Forty Under 40” list each year. There’s no doubt that the industry needs these new thought leaders to emerge. But here’s the thing, industry, and particularly energy, is still very much run by some creative and innovative people with vast amounts of experience. They were once the up-and-comers of their day.

The fact is, all of those sub-40s will be in their 50s and 60s soon enough so let’s hope they aren’t suddenly dismissed as being out of touch. We need them to be the next leaders.

I know a lot of people in my age group who are leading very creative and disruptive businesses. Maybe we should start celebrating those more experienced leaders who still have it versus being focused on the next up.

4. Is it just me or does it seem like there are way too many oil and gas podcasts out there, many with the same schtick.

In a world of oversaturated markets, the oil and gas podcast market has to be near the top. Which reminds me, I should start a podcast. 

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A PHONE CALL AWAY

ENERGY POLICY



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It's crazy how quickly things can change. A few months ago, the U.S. oil and gas industry was shunned by policymakers and investors alike. Today, however, soaring high commodity prices, a declining economy, a war in Europe and a looming election have changed all of that. Suddenly, the Biden administration is asking the domestic oil and gas industry to boost production to meet our own needs and those of our allies in Europe. Certain members of Congress are even accusing the industry of holding back production to keep prices higher.

Look no further than actual words for evidence of the shift in rhetoric. On a trip to Europe late last year, President Biden stated, "... the idea we're going to be able to move to renewable energy overnight and not have—from this moment on, not use oil or not use gas or not use hydrogen is just not rational." U.S. Special Presidential Envoy for Climate John Kerry said recently that "gas is going to be a key component in the energy transition." In March, U.S. Energy Secretary Jennifer Granholm said. "... we need more supply ... right now, we need oil and gas production to rise ..." Quite the turnaround from what administration officials were saying during the first several months of 2021.

So, what changed?

First, there is the pain at the pump. U.S. consumers are angry about gasoline prices that have nearly doubled in a little over a year. High energy prices are affecting nearly every aspect of the U.S. economy and are contributing to high inflation. While oil and gas production has recovered in the U.S., the Biden administration has taken actions that impact oil and gas leasing on federal lands and waters as well as pipeline development. As a result, energy companies and their investors and financiers are concerned about the viability of long-term investments in fossil energy projects all across the energy value chain.

Additionally, the Russian war on Ukraine has resulted in a rapid loss of Russian barrels from western markets and is cutting off the supply of Russian gas in Europe at a time that the continent was already suffering from high energy costs. The impact in Europe has been devastating to manufacturers and consumers alike. The average German,

for instance, will pay 6,000 more euros this year for energy than they did last year.

Amid tighter supplies and higher energy costs impacting our allies and American businesses and consumers here at home, in late March President Biden announced in Europe that the U.S. would deliver 15 MMcm of additional LNG through the end of the year. Also in late March, President Biden committed to withdrawing roughly 1 MMbbl/d from the Strategic Petroleum Reserve (SPR), placing an additional 180 MMbbl of oil into the market.

While the U.S. is capable of delivering on those two commitments, in both instances the decisions were made without serious input by, or consultation with, the industry. That is an unfortunate trend, as the industry is a critical source of knowledge on how to best supply the market. Furthermore, the SPR decision will put a serious dent in the nation's crude stockpile and thereby decrease our energy security.

If we are truly going to meet our commitments to ensure reliable and affordable energy for Americans and our allies over the long term, we must address government policies that have caused serious problems along the petroleum value chain. In short, we need a plan or a roadmap, and a commitment rather than a reluctance to consult with industry. The U.S. government has a long tradition of collaborative studies and planning alongside industry on how to meet our nation's energy needs, including through entities such as the National Petroleum Council. Surely this is a time where such cooperation is sorely needed, and the industry wants to help.

It is clear that many in Washington do not understand the complexities of the energy value chain. At the same time, there has been much talk recently about the need to address the energy transition and energy security at the same time along parallel tracks. This is a vast improvement over the contentious talk about energy policy we have grown accustomed to and could provide an opening for constructive dialogue and lasting solutions. Industry is ready and willing to work collaboratively to address these problems.

All the government has to do is pick up the phone and ask. ☎️



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PERMITS

With the exception of 2017, the price of WTI and the number of permits issued to produce it have tracked each other closely throughout the shale era. Since the advent of the COVID-19 pandemic, however, the two have diverged sharply.

In January 2020, U.S. permits totaled about 2,900, and the price of WTI had dipped just slightly from December to average a sturdy \$57.52/bbl for the month. After that, both suffered a harsh decline, with WTI slumping to its nadir of \$16.55/bbl in April 2020 and the number of permits to barely above 1,000 in May.

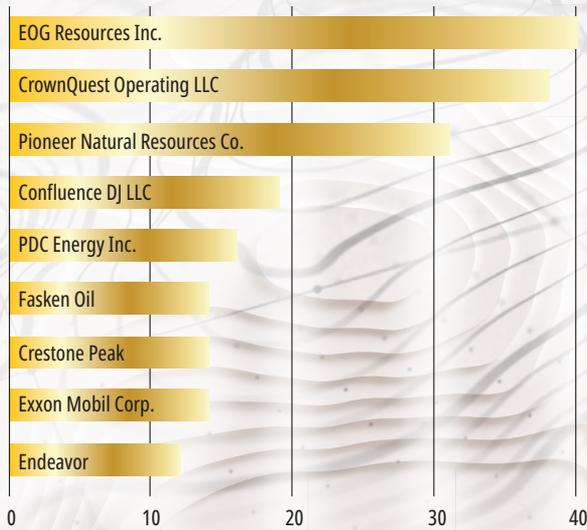
From there, WTI commenced a slow but steady climb in which the February 2022 average price eclipsed \$90/bbl. The number of permits issued in February, however, was the lowest in more than a decade.

The phenomenon stems from an industrywide response to investors, who have set returns as a priority over growth. Producers are loathe to pump up their capex budgets again, only to struggle with a subsequent crash in prices as a result of overdrilling.

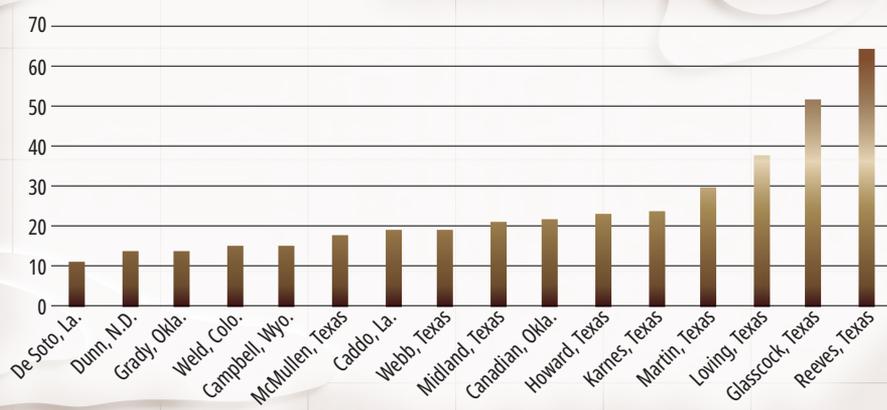
Texas counties dominated the leaders in permitting, particularly those in the Permian Basin. On the New Mexico side of the Permian, which is mostly federal land, no permits were issued.

EOG Resources Inc., CrownQuest Operating LLC and Pioneer Natural Resources Co. secured the most permits in this time period.

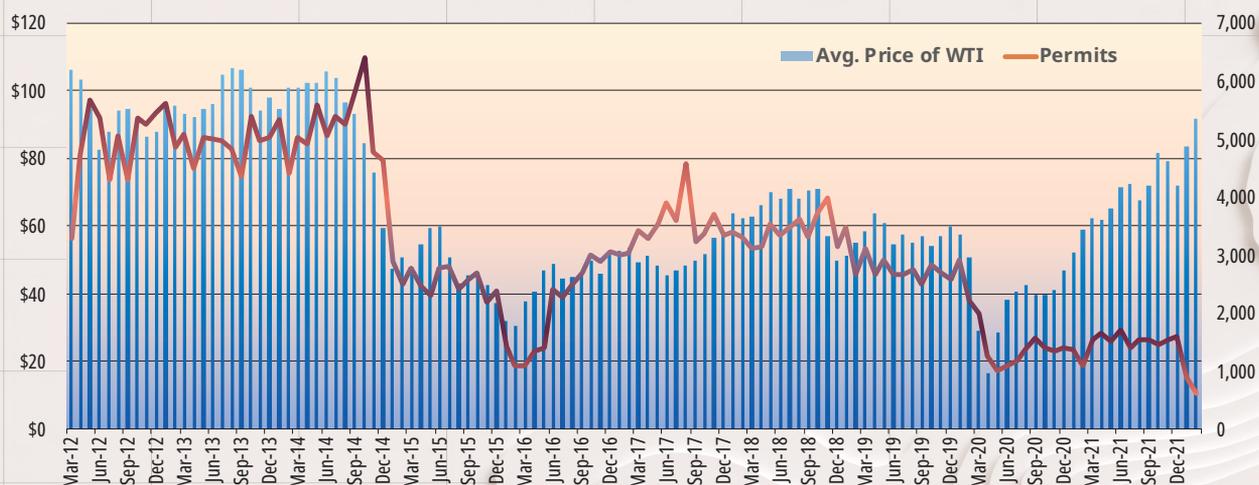
Permitted Wells By Operator Well Count



Permitted Wells By County



The Pandemic Effect: Permits Vs. WTI Price Monthly, March 2012-February 2022



Data from Rextag ENERGY DATALINK



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Many thanks to the pioneers who led with courage and fortitude to make the Permian Basin the success it is today. And to Pioneer's founders, Howard Parker and Joe Parsley and our CEO Scott Sheffield – Thank you for your steadfast belief in the power of the Permian Basin.

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Industry Leading Speakers:

- **Andy Huggins**, SVP, Haynesville Division, Southwestern Energy Co.
- **Darin Zanovich**, President & CEO, Mesa Minerals Partners II LLC
- **Elliott Kruppa**, Chief Financial Officer, Sabine Oil & Gas Corporation
- **Bob Barba**, PE, Integrated Energy Services Inc.
- **Alan Smith**, President & CEO, Rockcliff Energy LLC
- **Jennifer Stewart**, Principal Advisor, Equitable Origin
- **Rob Turnham**, President, Turnham Interests Inc.
- **Gordon Huddleston**, Co-President & Partner, Aethon Energy
- **Dick Stoneburner**, Chairman, Tamboran Resources Ltd.; Senior Advisor, Pine Brook Partners
- **Kyle Koontz**, Chief Operating Officer, BPX Energy
- **Darin A. Zanovich**, President & CEO, Mesa Minerals Partners II, LLC

Haynesville Reception at Bally's

On Wednesday, May 25th, join in the merriment during Sierra Frac Sands annual DUG Haynesville reception at Bally's – formerly the Eldorado Casino Shreveport. All DUG Haynesville attendees are invited to attend this annual gathering of party goers.

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FOCUS ON: MARCELLUS SHALE

Tucked into the northeast corner of Pennsylvania, Susquehanna County is much closer to New York City (163 miles) than to Pittsburgh (329 miles), the capital of the Appalachian Basin. Still, the county of 41,000 people in the Endless Mountains is much more Big Shale than Big Apple.

Susquehanna's 2,937 wells produced 1.62 Bcf of natural gas in 2021, more than any other county in the Marcellus Shale. Indeed, a chart depicting the county's gas production, akin to the path of a jet soaring into the sky, is pretty much the picture of the U.S. shale revolution itself.

But Susquehanna is only the leader. All told, output from the 148,000 wells spanning the entire Marcellus totaled 36.2 Bcf in 2021. The U.S. Geological Survey (USGS) estimates the Marcellus to hold about 84 Tcf of technically

recoverable gas or more than the Energy Information Administration's (EIA) estimate for Australia's reserves.

That wasn't always the case. Twenty years ago, the USGS estimate for the middle-Devonian Age, low-density black shale of the Marcellus formation was about 1.9 Tcf.

In an exceptionally volatile year like this one, projections on energy production tend to be ephemeral. Too many factors, from economic to geopolitical, are wreaking havoc on production modeling on a daily basis.

The trends are clear, though. Natural gas production is rising, and the Marcellus Shale is a chief contributor. In 2017, U.S. natural gas production totaled 74.9 Bcf/d, the EIA reported. By 2021, output was up to 93.6 Bcf/d. This year, the expectation is an average of 96.7 Bcf/d, with continued growth to 99.1 Bcf/d in 2023.

Susquehanna County, Pa., Gas Production

Monthly, MMcf, since January 2011



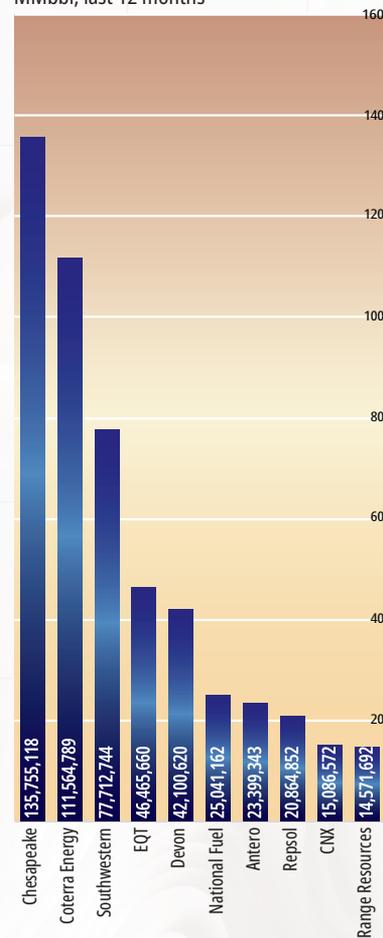
Marcellus Natural Gas Production

MMcf, January 2011-November 2021



Largest Marcellus Gas Producers

MMbbl, last 12 months



A&D WATCH

UTAH'S—YES, UTAH—M&A SPREE



While it's inevitable that another basin snatches a ray of limelight from the Permian Basin from time to time, probably no one expected a rare run on Utah's Uinta Basin, where M&A has suddenly been heating up.

Maybe Utah was due. The number of rigs in Utah has nearly doubled from six last April to 13 as of April 1, according to the **Baker Hughes** rig count.

For perspective, the last major transaction involving the Uinta when **Ovintiv Inc.** (then Encana Corp.) purchased **Newfield Exploration Co.**'s assets in February 2019 for \$5.5 billion and the assumption of \$2.2 billion in debt.

Times have changed but so have prices. **Crescent Energy Co.** on March 30 closed its acquisition of Uinta Basin assets in Utah previously owned by **EP Energy** for \$690 million, a final number that was about 15% lower than the originally announced \$815 million price tag.

Buyer/Seller	Amount (\$MM)	Acreage	Production
Crescent Energy Co.	\$690	145,000	30,000 boe/d (65% liquids)
Greylock Energy	N/A	290,000	1,000 bbl/d oil; 1,500 bbl/d NGL
Ovintiv (possible divestiture)	N/A	207,000	13,000 boe/d

Source: Hart Energy

Utah Oil, Gas Production, 2017-2021

Year	Oil (bbl)	Gas (Mcf)
2021	35,014,155	239,042,296
2020	31,000,987	242,582,202
2019	36,933,430	272,993,698
2018	37,116,941	295,825,783
2017	34,437,937	315,197,367

Source: Utah state statistics

Houston-based Crescent Energy in February said it would buy the Uinta Basin assets in an all-cash transaction from **Verdun Oil Co. II LLC**, an **EnCap Investments LP**-backed firm formed in 2015.

The Uinta acquisition included approximately 145,000 contiguous net acres in Utah, producing about 30,000 boe/d, roughly 65% oil. EP Energy had previously owned the assets, according to the Crescent Energy release on Feb. 16.

In August 2021, EnCap Investments had agreed to take over EP Energy's assets in the Eagle Ford and Uinta basins

in a \$1.5 billion deal, less than a year after EP Energy emerged from a bankruptcy process that handed control to its creditors.

However, U.S. antitrust regulators had threatened to block EnCap's takeover of the EP Energy assets, citing concerns about the private equity firm's dominance in the Uinta shale play.

On March 25, Reuters reported that the U.S. Federal Trade Commission (FTC) approved EnCap's \$1.5 billion takeover of EP Energy on the condition that the firm sell EP Energy's entire Utah oil business.

The FTC said the deal without the sale of the assets in Utah would have left just three significant producers that sell Uinta Basin crude oil to refiners in Salt Lake City and led to higher prices for consumers.

Caerus Oil and Gas LLC is also reportedly exploring a sale that could value the private equity-owned natural gas producer at more than \$2.5 billion, including debt, people familiar with the matter said on March 25. The company owns E&P assets centered in the Piceance Basin of Colorado and the Uinta Basin of Utah.

The company received an acquisition offer at the end of last year and plans to launch a sale process, said the sources. They cautioned that no sale is certain and spoke on condition of anonymity to discuss private information.

Caerus is owned by investment firms **Oaktree Capital Management, Anschutz Investment Co.** and **Old Ironsides Energy**. The Denver-based company owns E&P assets, pipelines and mineral rights in the basins.

Caerus, which also bought **Occidental Petroleum Corp.**'s Uinta assets in 2020, produces natural gas from around 680,000 net acres, according to its website.

Also in March, **Greylock Energy** acquired roughly 290,000 gross acres and other assets in the Uinta and Green River basins of Utah and Wyoming from an undisclosed seller.

In an exclusive interview, Greylock CEO Kyle Mork said the expansion, which includes about 1,400 producing wells, will boost the company's oil production from about 1,000 bbl of oil per month in its conventional Appalachia assets to 1,000 bbl/d.

"It's almost a thirtyfold increase, and then the wells also produce a significant amount of NGL, call it 1,500 bbl/d or so of NGL," Mork said, adding he could not disclose the price of the deal.

Mork said the asset was attractive for several reasons, including its exposure to liquids.

"We like geographically where it sits. In recent years, we're taking a pretty big discount to Henry Hub [prices] and these assets are really kind of the opposite. They generally are trading flat or even at a premium to Henry Hub because a lot of this gas ultimately gets exposure to the West Coast and even to California."

In addition to the new assets, Greylock will also retain about 60 employees from the seller, Mork said.

While financial details weren't disclosed, he said that the deal was negotiated on a PDP value basis and did not ascribe any value to upside potential.

Mork anticipated that it will continue to transact in more PDP-heavy deals.

And finally, Ovintiv was on the lookout to hire an investment bank to consider options for its acreage in the Uinta, as it looks to cash in on a boom in energy prices to cut debt, three sources familiar with the matter told Reuters on Feb. 22.

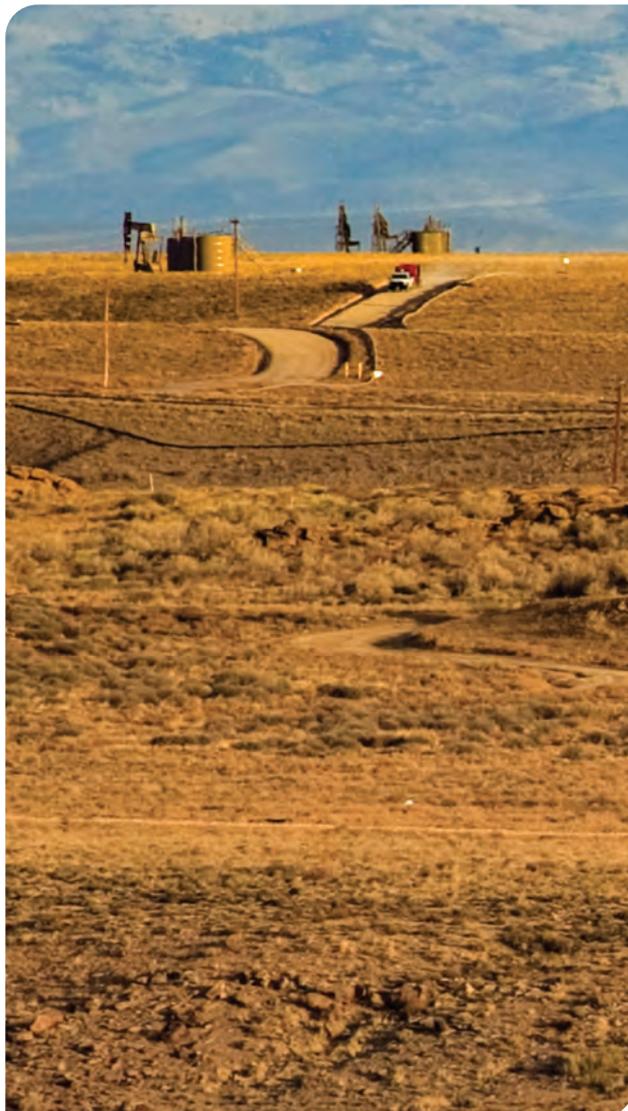
A full or partial sale would be among the options for Ovintiv, one of the top producers in the Uinta Basin, the sources said, adding that a sale of the assets could fetch around \$1 billion.

No final decision has been made about the assets, and Ovintiv could still decide to retain them, the sources cautioned. They requested anonymity as the discussions are confidential.

An Ovintiv spokesperson said the company does not comment on potential or rumored acquisition or divestiture activity.

Ovintiv's assets spanned around 207,000 net acres in central Utah and had production of around 13,000 boe/d as of its 2020 annual report.

—Darren Barbee





TARGA RESOURCES ACQUIRES SOUTHCROSS IN \$200 MILLION ‘BOLT-ON’

Targa Resources Corp. executed agreements to acquire **Southcross Energy Operating LLC** and its subsidiaries in South Texas for \$200 million in what Houston-based Targa described as a “bolt-on.”

Southcross Energy Partners emerged from Chapter 11 bankruptcy protection in February 2020, following completion of a restructuring that resulted in the MLP becoming a privately held company and moving its headquarters to Houston from Dallas.

The acquisition, announced March 17, follows comments made by Targa management on the company’s earnings call in late February that Targa was actively looking at “bolt-on or tuck-in acquisitions” across its footprint with a couple of caveats.

“As we look at acquisitions, we want to make sure we’re staying within our leverage range. We want to make sure that we have good synergies on the G&P side and on the NGL side,” Targa CEO Matt Meloy said, according to a Seeking Alpha transcript of the Feb. 24 call.

“We’re in a good position where we don’t need to acquire anything. So, it’s really got to be additive. It’s got to be at a good value for us with synergies that drive that value down even more,” Meloy added.

Southcross Energy has a network of pipelines that currently spans 24 counties in South Texas in the Eagle Ford Shale and upper Gulf Coast areas with interconnect to all the major intrastate and interstate pipelines along the Gulf Coast, according to the company website, including direct access to the Corpus Christi ship channel and Agua Dulce market areas.

The network of pipelines has a total capacity of 500 MMcf/d and comprises two sour gas treating plants with a total capacity of 200 MMcf/d and approximately 2,500

miles of pipeline, the company website said.

According to the Targa release, the Southcross acquisition price represents approximately four times adjusted EBITDA multiple and includes synergy potential to reduce the acquisition multiple over time.

The Southcross acquisition includes fee-based contracts, with the vast majority of volumes being low-pressure wellhead gathering plus the potential to move a currently idle 200-MMcf/d plant.

Targa also expects continued simplification as a result of the acquisition as the company is set to acquire the remaining interests in two joint ventures Targa has with Southcross in South Texas.

The acquisition is expected to close in the second quarter following customary closing conditions. **Wells Fargo Securities LLC** is serving as Targa’s financial adviser, and **Winston & Strawn LLP** is acting as the company’s legal counsel on the transaction.

Targa is one of the largest independent midstream infrastructure companies in North America. The company’s gathering and processing assets are across multiple shale and natural resource plays, including the Permian Basin, Bakken Shale, Barnett Shale, Eagle Ford Shale, Anadarko Basin, Arkoma Basin, onshore Louisiana and the Gulf of Mexico.

—Emily Patsy

CONOCOPHILLIPS CONTINUES PARING ASSETS WITH POTENTIAL MIDCONTINENT DIVESTITURE

Looking to capitalize on higher commodity prices, **ConocoPhillips Co.** is marketing nearly 280,000 net acres, including leasehold in the western Anadarko Basin and nonoperated assets in the STACK and SCOOP plays.

Marketing materials from **Wells Fargo** labeled "Spring 2022" show the assets' EBITDA, annualized by first-quarter 2021 results, is about \$97.5 million.

ConocoPhillips previously announced an asset disposition target of up to \$5 billion by 2023 while it works to whittle away its debt by 2026 to about \$15 billion, including \$800 million that matures this year. In February, the company closed the sale of Indonesia assets for \$1.65 billion and roughly \$700 million in the Lower 48 since last year.

In a February earnings call, chairman and CEO Ryan Lance said that in the Lower 48, ConocoPhillips "generated \$0.3 billion in proceeds from the sale of noncore assets last year and [in January] ... signed an agreement to sell an additional property set outside of our core areas for an additional \$440 million."

The company is deciding what it will sell based on historical cash flow, Lance said.

"Cash is cash," he said. "We just want to take advantage of the strong markets we're seeing today, and we recognize that we've made two pretty transformational transactions over the course of the last year, and it's raised the bar in our whole company on cost of supply."

ConocoPhillips in January 2021 closed the acquisition

of Permian independent **Concho Resources Inc.** in an all-stock transaction valued at \$13.3 billion. The company also closed last year with its purchase of **Shell Plc's** Permian Basin asset in a \$9.5 billion deal completed in December.

Based on the current portfolio, Lance said, "There's things that we're probably not going to invest in that we recognize others will invest in."

He added that the company was continuing to high-grade its portfolio, primarily in the Permian Basin.

ConocoPhillips' marketed acreage in the Anadarko Basin includes 261,200 net acres, 100% HBP, which produces 77% gas and 23% liquids in first-quarter 2021. The assets target the Cleveland, Granite Wash and Tonkawa basins.

The marketing materials show a base decline of less than 6% with 66% cash flow margins because of high net royalty interest and royalty interests.

The nonoperated assets cover 17,700 net acres and split gas and liquids production. The primary targets for operators there are the Woodford, Springer, Meramec and Sycamore.

—Darren Barbee

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DELOITTE REPORT: M&A, OIL PRICE PART WAYS

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Uncertainty from geopolitical headwinds and wild swings in commodity prices are likely to give the M&A market a hard time picking up speed after an uneven year of transactions hamstrung by E&P's parsimony.

Top of mind for transactions is the Russian Federation's brutal invasion of Ukraine, which has seen WTI prices careening in the space of a week from \$130/bbl on March 8 to \$96.44 seven days later.

Deloitte's view of the war is that a tight oil market has become even tighter. In a March report, Deloitte said that despite record cash flows, a combination of geopolitical uncertainty, trade controls, inflation and shareholder returns will make oil and gas firms "highly cautious in their spending for M&A in 2022."

"Even beyond the current state of global economics and energy markets, our analysis of 2021 dealmaking shows fundamental changes to the M&A strategy of O&G [oil and gas] companies, which we expect to see play out in 2022," the March 10 report said.

Discounting the 2020 pandemic year, global upstream M&A deal count remained at a 15-year low—or at about the same level as pre-shale 2005—although an improved macro and oil price sentiment brought back a few opportunistic buyers in 2021. Deloitte points to a decoupling of M&A and rising commodity prices, which the report posits is part of a growing consensus that "long-term demand outlook for hydrocarbons is bearish."

"O&G capex and M&A decoupled from oil prices in 2021. Despite a 75% rebound in prices, deal activity

increased by only 32%, and capex grew by only 17%," Deloitte said. "Rewarding shareholders through increased payouts and divestment of less-economical or carbon-heavy hydrocarbon reserves drove O&G stakeholder expectations in 2021."

That fiscal approach has supplanted the companies' previous imperative to keep their reserve replacement rate at 100%. Stakeholders more interested in production companies reducing their environmental footprint to become lean and efficient hydrocarbon producers, the report said.

Companies are rewriting the M&A playbook, falling back from previously aggressive tactical and cyclical acquisition in favor of a more restrained, strategic and environment-focused buying that was evident in 2021.

The first half of 2021 saw the lowest level of oil and gas deal activity in the past 10 years, but it somewhat rebounded in the second half. Overall, global oil and gas M&A deal value in 2021 rose by a "modest" 18% to \$269 billion, compared to 2020, with recoveries in upstream and oilfield services offsetting weakness in midstream and downstream, Deloitte said.

—Darren Barbee



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DELAWARE BASIN

Petro-Hunt LLC picked up Delaware Basin assets from **Admiral Permian Resources**, Dallas-based Petro-Hunt said in a company release on March 9.

According to the release, **Petro-Hunt Permian LLC**, a fully owned subsidiary of the company, completed the acquisition of the Delaware Basin assets from **APR Operating LLC** (dba Admiral Permian Resources). Terms of the transaction weren't disclosed.

Admiral Permian Resources is a privately held E&P company focused on the acquisition and development of oil and gas properties in the Permian Basin. The company, headquartered in Midland, Texas, is majority owned by funds managed by the private equity group of **Ares Management LP** and is also backed by **Pine Brook** and members of management.

The acquired APR assets consist of predominantly operated oil and gas production and 21,430 net acres of leasehold in northwest Reeves and northeast Culberson counties, Texas, in the Delaware Basin. Current gross operated production is approximately 7,000 bbl/d of oil and 100 MMcf/d of gas.

"Petro-Hunt plans to commence an active development drilling program on these assets later this year," the company said in the release.

Including the acquired APR assets, Petro-Hunt said on March 9 that the company, its subsidiaries and affiliates had current gross operated production capacity of approximately 57,000 bbl/d of oil and 220 MMcf/d of gas.

MONTNEY SHALE

Vermilion Energy Inc. recently agreed to acquire **Leucrotta Exploration Inc.** for a net cash purchase price of CA\$477 million, expanding the company's position in the Montney Shale play.

"The Leucrotta acquisition is an important component of our strategic plan, as it is a scalable asset and is expected to provide us with 20-plus years of high-value, Tier 1 drilling inventory," Vermilion president Dion Hatcher commented in a release by the Calgary, Alberta-based company on March 28.

Leucrotta is a Canadian publicly listed Montney-focused oil and natural

gas exploration and development company with lands located in the Mica area of Northeast British Columbia and Northwest Alberta. Vermilion's acquisition of Leucrotta follows an agreement to acquire **Equinor Energy Ireland Ltd.** last November for CA\$556 million (US\$434 million).

The acquisition of Equinor Energy Ireland will add to Vermilion's holdings in the Corrib gas field off the northwest coast of Ireland, which Hatcher said increases the company's European gas exposure while also accelerating its debt reduction.

"With the successful completion of both deals, our \$1 billion debt reduction target should be achieved by the end of this year, three years ahead of schedule, with a corresponding forecast net debt to FFO [funds from operation] ratio of 0.4x, which is well below our target range of 1.5x," he said.

"In fact," he continued "by the end of 2023, at current strip prices, Vermilion is projected to be net debt free. By the end of this year, we expect to have achieved our key near-term strategic objectives, and most importantly, we did so without the issuance of any additional shares, which maximizes the free cash flow for our shareholders and eliminates any potential dilution."

The Leucrotta acquisition is expected to close in the second half of May. The Corrib acquisition is set to close during the second half of 2022.

The primary Leucrotta asset is the Mica property, which comprises 81,000 gross (77,000 net) contiguous acres of Montney mineral rights in the Peace River Arch straddling the Alberta and British Columbia borders. The asset is forecasted to produce approximately 13,000 boe/d in 2023, with anticipated capacity to grow to a sustainable plateau production base of 28,000 boe/d over the next few years.

As part of the acquisition arrangement, a portion of the Leucrotta land base and approximately CA\$43.5 million in cash will be transferred to a new company, which will be managed by the existing Leucrotta team.

CIBC Capital Markets serves as exclusive financial adviser to Vermilion with respect to the Leucrotta acquisition. **Torys LLP** acted as legal counsel to Vermilion.

WILLISTON BASIN

Exxon Mobil Corp. is considering a sale of assets in North Dakota's Bakken after drawing interest from potential suitors, Bloomberg News reported on March 10, citing people familiar with the matter.

The Bakken properties could be worth about \$5 billion, and the oil major is in the final round of interviewing bankers to help launch the sale process, the report said.

An Exxon Mobil spokesperson told Reuters the company does not comment on rumors or speculation.

The top U.S. oil producer set a goal three years ago of raising \$15 billion from asset sales and put several U.S. and international assets on the market as energy prices rally to multiyear highs.

Exxon Mobil has been on a major cost-cutting drive after suffering a historic loss in 2020. In January, the company disclosed a sweeping restructuring of its global operations.

Exxon Mobil recently said it will further slash expenses and its oil and gas production portfolio to boost returns.

ANGOLA

Eni SpA and **BP Plc** have completed a deal to merge their oil and gas operations in Angola, the groups said on March 11, confirming what sources earlier exclusively told Reuters.

The deal will create a company called **Azule Energy** that is expected to be Angola's largest producer with stakes in 16 licenses and in the Angola LNG joint venture.

Azule Energy will also take over Eni's stake in **Solenova**, a solar company jointly held with Angola's **Sonangol**.

Three sources said the two energy groups were close to raising around \$2.5 billion in financing to help fund the joint venture and were also close to a separate agreement for Eni to buy stakes in Algerian gas plants.

The two companies last year announced plans to combine their Angolan businesses into a self-funded company with oil and gas production of around 200,000 boe/d.

MARCELLUS SHALE

Chesapeake Energy Corp. on March 9 completed its previously announced multibillion-dollar acquisition of **Chief E&D Holdings LP** and associated

nonoperated interests held by affiliates of **Tug Hill Inc.**

"The Chief transaction deepens our premium inventory, allowing us to allocate additional capital toward our world class Marcellus Shale position and accelerate returns for our shareholders," Nick Dell'Osso, Chesapeake's president and CEO, commented in a company release.

"With the integration of these assets into our existing portfolio," Dell'Osso continued, "we look forward to generating greater free cash flow, growing our dividend programs and improving our [greenhouse-gas] emissions metrics as we continue to responsibly deliver reliable, affordable, lower carbon energy in 2022 and beyond."

According to the transaction agreement, Chesapeake acquired privately held **Chief Oil & Gas** and associated nonoperated interests held by affiliates of Tug Hill for \$2 billion in cash and approximately 9.44 million common shares. Analysts with **Tudor, Pickering, Holt & Co.** estimate the cash-and-stock deal structure implies a roughly \$2.6 billion total price tag.

Additionally, Chesapeake also announced on Jan. 25 an agreement to sell its Powder River Basin assets in Wyoming to **Continental Resources Inc.** for \$450 million in cash. The Powder River transaction is expected to close by the end of first-quarter 2022, at which Chesapeake's newly simplified portfolio will include refocused positions in the Marcellus, Haynesville and Eagle Ford shale plays.

For the Chief acquisitions, **RBC Capital Markets** served as financial adviser to Chesapeake. **Shearman & Sterling LLP** served as its legal adviser and **DrivePath Advisors** as communications adviser.

J.P. Morgan Securities LLC is financial adviser, and **Gibson, Dunn & Crutcher LLP** is legal adviser to Chief and Tug Hill. **Akin Gump Strauss Hauer & Feld LLP** is also serving as legal adviser to Tug Hill and its affiliates.

SERVICE & SUPPLY

Liberty Lift Solutions LLC on April 1 acquired the assets of **Elite Lift Solutions LLC** and **Powder River Hydraulics LLC**, with facilities in Dickinson and Williston, N.D., as well as Gillette, Wyo.

"It's very exciting to have the Elite Lift Solutions and Powder River Hydraulics veteran teams join our Liberty Lift organization," Liberty Lift CEO Bobby Evans commented in the release. "They have seen significant growth due to their quality products and focus on customer service."

Elite Lift Solutions specializes in the sales and service of downhole production equipment and driven pile foundations for pumping units and facility equipment.

Powder River Hydraulics specializes in multiple jet pump and progressive cavity pump sales and services, including multiplex surface skids for saltwater disposal and jet pump applications, rental units, downhole jet pump equipment, as well as repair and service on all these products.

Houston-based Liberty Lift did not disclose the terms of either transaction. The acquisitions follow Liberty Lift's asset acquisition in January of **Corral Oil Field Services LLC**, a family-owned and -operated artificial lift company in the Permian Basin.

HAYNESVILLE

ArcLight Capital Partners LLC recently entered into an agreement with an undisclosed seller for its affiliate **Saber Midstream LLC** to acquire a natural gas gathering system in the Haynesville Shale basin of Louisiana and Texas.

In a release announcing the acquisition on March 23, ArcLight said the management team of **Cutlass Energy Partners LLC**, a midstream infrastructure company backed by the Boston-based private equity firm, will manage Saber Midstream and the operations of the acquired gas gathering system.

"Cutlass is excited to establish itself as a natural gas infrastructure player in the Haynesville via its partnership with ArcLight in Saber Midstream," Cutlass CEO Don Kirkendall commented in the release.

Cutlass Energy Partners is a Houston-based midstream energy company founded in 2019 by Kirkendall, David Lipp and Greg Beilstein. The Cutlass team has had a long association with ArcLight, including various gathering ventures in the Permian Basin, Eagle Ford, Marcellus Shale and Utica trend,

and a gas transmission pipeline connecting Louisiana and Arkansas.

The Haynesville system in Louisiana's Caddo Parish and Harrison County, Texas, has a nominal capacity of up to 1.2 Bcf/d. It is in an area of the Haynesville Shale play with increasing rig activity and growing production, plus access to supply large markets in Louisiana and Texas, including growing LNG export markets, according to the release.

Constructed between 2020 and 2022, the Haynesville system was designed with an ESG focus for efficient operations and to minimize emissions, including solar- and battery-powered meters, the release noted.

King & Spalding LLP, led by Chris Delphin, Tyler Brown and Austin Paalz, served as legal counsel on the Haynesville transaction.

ALASKA

Australia's **Santos Ltd.** is locked in a dispute with **ConocoPhillips Co.** over road access in Alaska, potentially holding up a \$3 billion oil project, according to letters from both companies to the U.S. state's government.

The dispute could also delay Santos' planned sale of its majority stake in the project, which could thwart its target of raising \$2 billion to \$3 billion from asset sales in 2022.

ConocoPhillips, the largest oil producer in Alaska, is seen as a potential buyer of that stake.

Santos is the operator of the Pikka oil project on Alaska's North Slope, acquired during its takeover of **Oil Search** last year. In February, it flagged that the project would be ready for a final investment decision by midyear.

The Pikka project, the biggest new oil prospect on Alaska state land in decades, is next to ConocoPhillips' Kuparuk River Unit oil fields. Santos needs access to Kuparuk's roads for its operations, the company said in a Feb. 9 letter to the Alaska Department of Natural Resources.

After rebuffing a ConocoPhillips proposal for Oil Search to pay \$95 million for long-term use of its Kuparuk roads, Oil Search applied to the Department of Natural Resources for a permit to access those roads, which are on state land.

The department approved the land use permit on March 29 to smooth the

way toward development of the Pikka project until the companies reach a road use agreement.

A Santos spokesperson said the company was satisfied with the state's decision and still aims to have Pikka ready for a final investment decision in "mid-2022." ConocoPhillips has the right to appeal the issue of the land permit by April 18.

ConocoPhillips declined to comment on Santos' stake sale. The Pikka project is co-owned by Spain's **Repsol SA**.

ANADARKO BASIN

Privately held **Red Bluff Resources LLC** and its partner, **Bricktown Energy**, are working with an investment bank to find buyers for their Anadarko Basin assets that could fetch more than \$500 million in total, a source familiar with the matter said.

The companies together hold around 80,000 net acres of land in the Anadarko Basin of Oklahoma and have forecast a total 2022 production of around 17,000 boe/d, according to a marketing document seen by Reuters.

The source requested anonymity as the sale discussions were confidential. Red Bluff and Bricktown did not immediately respond to requests for comment.

A supply crunch has driven oil prices in recent months to levels not seen since the financial crisis of 2008, accelerating dealmaking in the industry. That has given private teams a rare window to exit investments profitably, with prices of global benchmark Brent crude trading around \$100 a barrel on March 16.

Those elevated levels have prompted a call for U.S. shale producers to boost production, bringing back to prominence higher-cost basins like the SCOOP and STACK of Oklahoma, where Red Bluff and Bricktown operate.

Red Bluff estimates its 2022 production will average 13,000 boe/d, while Bricktown expects 4,000 boe/d of output for the year, according to the marketing document.

The two Oklahoma City-based producers together have interests in around 1,031 producing wells, the document shows. The owners of the two companies are open to selling

them together or separately, according to the document.

HAYNESVILLE

Fort Worth-based **Pine Wave Energy Partners LLC** announced on March 14 that it has entered into a definitive agreement to sell certain Haynesville assets located in Caddo Parish, La., and Harrison and Panola Counties, Texas, to affiliates of **Silver Hill Energy Partners III LP**.

Pine Wave's assets consist of approximately 12,500 net acres with ownership interests in 10 operated wells with approximately 100 MMcf/d of production.

Also included in the transaction is Pine Wave's associated midstream infrastructure, including 18 miles of natural gas gathering pipelines located in Caddo Parish and Panola County.

The deal is expected in the second quarter of 2022 and is subject to customary approvals and closing conditions. Upon closing, Pine Wave will continue to operate its other properties and pursue new opportunities as a portfolio company of **Old Ironsides Energy LLC**, according to a press release.

"This transaction with Silver Hill is a significant step in the Pine Wave story," Ben Hunter, CEO of Pine Wave, said in a statement.

"Over the past four years we have worked to build an outstanding position in the Haynesville, and I am proud of the way our team has executed across the board. We are grateful for our ongoing partnership with Old Ironsides and look forward to shifting our operational focus to the company's next venture."

"We are excited to acquire these high-quality assets, which directly offset our existing operations in the heart of the Haynesville Shale," said Kyle Miller, founder, president and CEO of Silver Hill. "With this transaction, we are able to further expand our development inventory in an area that continues to present tremendous opportunity. Pine Wave has done a terrific job building its business and we expect to be able to positively leverage their strong position in the region."

Akin Gump Strauss Hauer & Feld LLP served as legal counsel to Pine

Wave's management team, and **Shearman & Sterling LLP** served as legal counsel to Silver Hill.

SAN JUAN BASIN

Whiptail Midstream acquired assets in the Gallup oil window of the San Juan Basin in northwest New Mexico from **DJR Energy** for an undisclosed amount, according to a release by the Tulsa, Okla.-based company.

The acquisition includes a long-term dedication of DJR's leasehold acreage for oil, natural gas and water production, more than doubling Whiptail's dedicated acreage, miles of pipeline and production flowing on its assets. Whiptail also plans to build out gathering infrastructure for DJR as it develops its acreage, according to CEO Josh Lamberton.

"We are excited to work with DJR in developing the midstream infrastructure that they need to support their activity in the San Juan Basin while also growing our network," Lamberton commented in the company release on March 21.

Whiptail was founded in 2016 by management and **I Squared Capital**. The company now has more than 475,000 dedicated acres and nearly 525 miles of pipeline in the San Juan Basin, the release said.

DJR is an oil and gas E&P company formed in April 2017 by **Lehman** and funded by **Trilantic Capital Management LP**, **Waveland Energy Partners** and **Global Energy Capital**. Since 2002, the DJR Energy management team successfully created and sold two companies in the Denver-Julesburg Basin of Colorado.

Whiptail plans to design the buildout of gathering infrastructure for DJR for multiwell pad development to minimize future surface disturbance. The combined portfolio offers multiple synergies to make the midstream infrastructure in the San Juan as efficient and reliable as possible.

Sidley Austin LLP served as legal counsel to Whiptail for the transaction. DJR was represented by **Latham & Watkins LLP**.

U.K.

Hungarian energy company **MOL** agreed on March 23 to sell its entire

upstream portfolio in the U.K. to **Waldorf Production Ltd.** for \$305 million in cash.

The divested offshore assets include MOL's 20% stake in Catcher Field, a 50% stake in **Scolty & Crathes** and a 21.8% stake in Scott as well as stakes in a number of other licenses. MOL's corresponding proved and probable reserves amounted to 14.9 MMBoe at year-end 2021.

"MOL's U.K. working interest production peaked above 18,000 boe/d in 2019 and has been falling in the last two years, accordingly Q4 2021 production was marginally above 12,000 boe/d," a MOL company release on March 23 said.

MOL Group entered the U.K. in 2014 by acquiring a portfolio of non-operated producing and development assets and has since been a significant production contributor to MOL's international portfolio, according to the company website.

Waldorf's offer on a base cash consideration of \$305 million to acquire MOL's upstream U.K. portfolio is subject to customary purchase price adjustments and is based on an economic effective date of Jan. 1. In addition, the agreement contains an earn-out scheme mainly dependent on oil prices during 2022 to 2025.

ESG

Project Canary acquired **Aeris Technologies**, a California-based provider of laser-based gas analyzers and leak detection systems, for an undisclosed amount, the company said in a March 24 release.

Headquartered in Denver, Project Canary has become a leading provider of independent third-party ESG data and holistic environmental assessments with numerous partnerships within the past year in the upstream and midstream oil and gas sectors, including most recently with U.S. oil major **Chevron Corp.** The company also recently completed a \$111 million Series B funding round and announced a partnership with a Big Four audit and consulting firm.

Project Canary's strategic acquisition of Aeris Technologies expands the company's services beyond the oil and gas sector and ushers in what Project

Canary CEO and co-founder Chris Romer describes as the "measurement economy."

"The measurement economy is here and not just for oil and gas; getting to net-zero, with accurate facility-level data, is also a mission-critical goal for agriculture, landfills and steel industries, and the sense of urgency has never been more profound," Romer commented in the release. "We're excited to welcome the Aeris team, which is deeply respected for its cutting-edge emissions management solutions, to the Project Canary family."

Aeris will maintain its operations as a Project Canary subsidiary based in California. All Aeris employees will join the combined company, according to a joint release.

Aeris Technologies quantifies greenhouse-gas emissions, atmospheric pollutants and natural gas leaks and has developed and commercialized state-of-the-art, laser-based gas analyzers. Formed by industry veterans as a next-generation, laser-based gas analyzer solutions company in Hayward, Calif., Aeris' instruments target wide-ranging environmental monitoring, laboratory analysis and industrial applications.

NORTH SEA

BP Plc is seeking buyers for its shut-down Foinaven oil field in the North Sea, hoping Britain's renewed focus on domestic production will attract buyers interested in extracting the field's remaining reserves, industry sources said.

BP halted production at Foinaven Field, west of the Shetland islands, last year after 25 years of activity and is preparing to dismantle its floating production vessel.

The field nevertheless still holds reserves of around 200 MMbbl of oil, which could be tapped in a relatively short time and with minimal investment, the three sources said.

The sale is part of a gradual retreat of BP and other big producers from the aging basin in recent years, selling assets to smaller companies that specialize in extending late-life fields.

It is unclear how much money BP could get from Foinaven Field, if any, given the clean-up or decommissioning, costs that would have to be negotiated, the sources said.

tioning, costs that would have to be negotiated, the sources said.

SERVICE & SUPPLY

Baker Hughes agreed on March 21 to acquire **Altus Intervention**, a leading international provider of well intervention services and downhole oil and gas technology with 40 years of industry experience.

Headquartered in Norway and employing 1,200 people globally, Altus Intervention specializes in fully integrated well intervention solutions, including proprietary technology. Historically focused on the North Sea, the company today operates in 11 countries that include the deepwater Gulf of Mexico, North American shale plays, the Middle East and offshore Malaysia, according to its website.

"The addition of Altus Intervention supports our strategy to transform core oil and gas operations by enhancing technological capabilities and providing customers with higher-efficiency solutions," Maria Claudia Borrás, executive vice president of oilfield services at Baker Hughes, commented in a company release.

"We value the Altus Intervention team's deep expertise and look forward to bringing these fully integrated well intervention solutions to our global customer base," Borrás continued.

The transaction is expected to close in the second half of 2022 and will be integrated into Baker Hughes' oilfield service segment. The acquisition agreement includes all intellectual property, personnel and commercial agreements. Terms of the deal were not disclosed.

"Our technology and techniques play a critical role in improving production, well intervention and plug and abandonment, and we believe this agreement with Baker Hughes is the right step forward," Åge Landro, CEO of Altus Intervention, said in the release. "We are focused on a long-standing vision of making intervention smarter to deliver real change operationally and commercially, and we look forward to leveraging Baker Hughes' strong network, complementary technology and global infrastructure in the oil and gas industry."



WHO'S WHO IN E&P A&D: ADAM DIRLAM

Northern Oil & Gas Inc. (NOG) is practically a new company less than a year after launching deals in the Permian Basin, North Dakota's Bakken and Marcellus Shale that transformed the company.

More than \$800 million in transactions effectively doubled the company's size and scale, set up a strong balance sheet and accelerated a dividend program with footprints in three basins, said Northern's president, Adam Dirlam, who leads the company's M&A and capital allocation efforts.

"We're certainly not done at NOG, but looking back on how we came together as a team and all of the hard work that was put in to get those deals over the finish line and implemented has been the most rewarding," Dirlam said.

Dirlam joined Northern, based in Minnetonka, Minn., in 2009 as "employee No. 4" and started in the finance and accounting group handling social, economic, environmental and cultural reporting and day-to-day operations before drifting to business development, he said.

"Working in A&D has always been what I've wanted to do, and the fast-paced nature of oil and gas means that there's never a dull moment," he said.

Northern's strategy remains firmly rooted in the shale 3.0 model that places emphasis on free cash flow and moderated production growth. In the past few years, the company has established itself as one of the premiere nonoperated franchises. Since 2018, the company has completed more than \$2 billion in acquisitions, Dirlam said, with other deals constantly being reviewed.

"On any given day, we're reviewing four to five potential acquisitions, which can range from small one-unit rig-up drilling opportunities to much larger consolidated asset packages with any combination of asset classes including existing production, wells in process and underlying acreage," he said. "The beauty of nonop is that you can effectively carve out a non-operated interest out of anything, which gives us the latitude to look at a multitude of different assets and build out our portfolio the way we see fit."

More recently, Northern has been working with operators on various drilling partnerships and jointly pursuing marketed assets.

"With the size and scale that we've been able to build over the last few years, we can partner with operators to review assets that wouldn't otherwise

be tenable for either party, adapt to ever-changing environments and underwrite assets more accurately than a typical financial provider of capital," he said. The common theme of any deal is that the asset is in the core of the basin, has a best-in-class operator and targets rock resilient in any commodity price environment.

Along with dealing with recent commodity price swings, Northern is also careful to deal with what Dirlam called the "right kind of sellers."

"We see folks testing the market with no intention to sell or are looking for a particular number in order to hit their waterfall, and we try to avoid those situations," he said.

The company is focused on acquiring nonoperated assets that ideally offer enough low-decline production it to be self-funding, efficient operators with wells in process and some longer-dated inventory.

"This gives us the ability to recycle our capital, generate meaningful cash flows for debt reduction and shareholder distributions, and expand and improve our already plentiful inventory," he said. With a shift toward value based on production, Northern has to be even more disciplined on what it targets as a nonoperated acquirer.

"If we don't have that sightline and confidence that the acreage is going to be developed, the acreage will be risked further with limited to no value being ascribed," he said. "In this high-price environment, we're seeing everything: the good, the bad and the ugly. I feel like a broken record on our quarterly earnings calls, but the number of opportunities that are out there is at an all-time high. Because of the volatility and varying expectations from the sellers, the conversion rate naturally comes down but ultimately the overall net activity grows or remains the same." 

25 **INFLUENTIAL** Women IN ENERGY

NOW ACCEPTING NOMINATIONS FOR 2023

Oil and Gas Investor invites you to nominate an exceptional industry executive for its 6th Annual **25 Influential Women in Energy** program. Help us celebrate women who have risen to the top of their professions and achieved outstanding success in the oil and gas industry.

Past honorees have included professional women from entrepreneurs to producers, midstream operators, service companies and the financial community. They've represented varied disciplines including engineering, finance, operations, banking, engineering, law, accounting, corporate development, human resources, trade association management and more across the upstream and midstream sectors. All nominees will be profiled in a special report that will mail to *Oil and Gas Investor* subscribers in April 2023.

The
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GOOD ADVICE: PROTECT AGAINST THE COSTS OF CYBERATTACKS

Who knew you could get cyber insurance? Meanwhile, prevention training can help avoid big costs in the event of an attack. Experts from **BOK Financial** offer this advice on the potential costs of cyberattacks.

Common Cyberattack Tactics And Purposes

- Data stolen and used for extortion and/or ransom
- Social engineering
- Invoice manipulation
- Phishing
- Business interruption

With geopolitical conflict, such as the Russia and Ukraine conflict, comes additional risk of cyber threat, but many businesses are unknowingly leaving their guard down. Those in the energy sector are particularly vulnerable.

Following the Colonial Pipeline attack in July 2021, the U.S. Department of Energy released statements voicing concern about the increase in cyberattacks on the nation's energy system which "demonstrated the power of malicious actors to shut down our nation's critical infrastructure and disrupt our energy supplies, economy and everyday lives."

In March 2022, after the U.S imposed sanctions against Russia following their invasion of Ukraine, President Biden and national security organizations were cautioning companies to be on the lookout for retaliation through cyberattacks.

"The energy sector is a unique combination of physical and cyber infrastructure often spanning vast geographical regions," said Mari Salazar, energy banker for BOK Financial. "This is one reason threat actors target these companies. It's a complex industry."

Learning your business isn't protected against threat can be costly.

The risks

"In the event of a cyberattack, companies face numerous risk categories and potential openings to incur costs," said Todd McLean, president of BOK Financial Insurance. "These include economic damage due to system shutdown, forensics required to verify systems integrity, determining if confidential data was stolen, notification costs, corporate credit card replacement, ransom demand solutions and third-party lawsuits. Expenses can also include public relations costs and the associated costs of explaining stories about the situation made to clients, specialized cyber attorneys, forensic fees and more."

Above and beyond those costs, McLean said businesses could expect to see lost income due to business interruption, damaged hardware, corrupt software and operating systems and a negative event associated with their brand and image.

"If your company was protecting information for a third party and that information was stolen, you could be in breach of a confidentiality agreement," McLean said. "When a company experiences a

data breach, a cyber-forensics team is brought in to determine what specific data was compromised including any potential breach of data and information associated with confidentiality agreements in relation to information the company digitally stores for their clients."

The training

For most businesses, refreshing training on the basics of good preventative disciplines at the human level is the first order of business, particularly since there have been two years of remote work, which is now becoming hybrid-working environments. "Human error is the most common cause of incidents and breaches," said McLean. "Investing in training your team and maintaining awareness with ongoing education and testing is necessary."

And for most, if not all, businesses, cyber insurance is the right final step in proactive cyber-related actions.

The insurance

McLean said cyber insurance can cover many costs, such as defense costs, judgments and settlements, fines and penalties, financial loss due to cyber business interruption, repair or replacement of equipment and programs, data restoration and multimedia liabilities associated with online content and copyrights. In all cases, the language to provide coverage must be present in the policy. Be aware of exclusions, and always seek to amend/seek addendum(s) to improve ensuring language where you believe it is critical to your business.

"The energy sector is as diverse as it is dynamic so protecting against threats isn't one size fits all," said Salazar. "But as we all know, the industry is vital to both our economy and daily life so protection against risk should be a top priority." 

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- Julien Perez, *Oil and Gas Climate Initiative*
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- David Finan, *EIV Capital*
- David Stewart, *Project Canary*
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“The reconfiguration of liquefied natural gas supplies from the U.S. and Canada to Europe and Asia is a big investment theme. There is a significant need for new investment.”

—**Gautam Bhandari**, *I Squared Capital managing partner*, in an interview with the *Financial Times* discussing the private capital firm’s raising of a \$15 billion fund to capitalize on Europe’s search for energy supply alternatives to Russia.

Read the article:

Scan here



“If you implement ESG initiatives separate from the operations, the likelihood of success is very low.”

—**Keila Hand**, *head of ESG at Quantum Energy Partners*, in a video interview explaining how the leading private equity firm evaluates ESG awareness while making investments.

See the video:

Scan here



Equinor ASA’s executive vice president for technology, digital and innovation (TDI), **Carri Lockhart**, has decided to resign from the Norwegian energy firm to return to the U.S.

Lockhart, who was recently named one of Hart Energy’s *Oil and Gas Investor* “25 Influential Women in Energy” honorees for 2022, joined Equinor in 2016 and has held several senior leadership roles in Norway and the U.S. before joining the company’s corporate executive committee in June 2021.

Senior vice president **Elisabeth Birkeland Kvalheim** has been appointed acting executive vice president for TDI.

Exxon Mobil Corp. appointed **Dan Ammann**, former General Motors (GM) president, to lead the Texas-based oil major’s lower-emissions business.

ExxonMobil Low Carbon Solutions is focused on commercializing low-emission business opportunities in carbon capture and storage, hydrogen and low-emission fuels, by leveraging the skills, knowledge and scale of Exxon Mobil.

Ammann, who will serve as president of ExxonMobil Low Carbon Solutions effective May 1, joins the company from Cruise, a GM majority-owned subsidiary focused on self-driving cars. He was named CEO of Cruise in 2018 and appointed president of GM in 2014 but had left the Detroit automaker in December.

Clearfork Midstream LLC added **Will Page** as CFO and a member of the board of directors and **Victor Davis** as executive vice president of operations.

With more than 23 years of investment banking experience advising energy companies in executing M&A transactions and capital raises, Page most recently served as managing director with Donovan Ventures, where he played a key role in Clearfork’s formation, financing and platform acquisition.

Davis has more 15 years of experience operating Clearfork’s acquired midstream assets having previously served as vice president of operations for Azure Midstream and its predecessor TGGT Midstream and as director of midstream operations for EXCO Resources.

Amplify Energy Corp. recently appointed former CEO of Civitas Resource Inc., **Eric T. Greager**, as well as retired Phillips 66 Co. exec **Deborah (Debbie) G. Adams** to its board of directors.

Previously, Greager served as president, CEO and executive director of Civitas Resources and its predecessor, Bonanza Creek Energy Inc., from 2018 until he stepped down in February following the company’s agreement to acquire privately held Bison Oil & Gas II LLC.

Prior to her retirement, Adams served as senior vice president of HSE, projects and procurement at Phillips 66 from June 2014 to October 2016, where she oversaw all the company’s regulatory affairs and processes. Before this position, she held roles of increasing responsibility at Phillips 66 and predecessor companies since 1983.

NEW FINANCINGS

EQUITY

Company	Exchange/ Symbol	Headquarters	Amount (\$MM)	Comments
ENGIE North America	N/A	Houston	\$800	Completed tax-equity financing for its Iron Star and Priddy wind projects in Ford County, KS, and Mills County, TX, and equity financing for the portfolio of these assets, plus the Hawtree solar project, in Warren County, NC, which recently declared commercial operations, which together total approximately 665 MW. Leading financial institutions participated in the financing, which included long-standing tax-equity relationships with Bank of America and Wells Fargo among others and a new relationship with InfraRed Capital Partners (US) , which provided equity investments for the projects.
Lime Rock Partners LLC	N/A	Houston	\$538	Closed its fifth Lime Rock Resources fund, Lime Rock Resources V , with capital commitments to the fund and an affiliated co-investment vehicle. The Houston-based Lime Rock Resources team will seek to acquire, improve and directly operate producing oil and gas properties in the U.S. Morgan, Lewis & Bockius LLP served as fund counsel.
Excelerate Energy Inc.	NYSE: EE	The Woodlands, Texas	\$416.2	Closed its IPO of 18.4 million shares of its Class A common stock, including the full exercise by the underwriters of their option to purchase 2.4 million additional shares of Class A common stock, at a price to the public of \$24 per share. Barclays, J.P. Morgan, and Morgan Stanley are joint lead book-running managers. Wells Fargo Securities also was a book-running manager. SMBC Nikko, Raymond James, Stephens Inc., Tudor, Pickering, Holt & Co. and BOK Financial Securities Inc. are co-managers.
Hess Midstream LP	NYSE: HESM	Houston	\$400	Executed a definitive agreement providing for the repurchase of Class B units by its subsidiary, Hess Midstream Operations LP , from affiliates of Hess Corp. and Global Infrastructure Partners , Hess Midstream's sponsors. The transaction is expected to optimize Hess Midstream's capital structure to its targeted 3.0x debt/adjusted EBITDA for full-year 2022 and provide significant and immediate accretion to its shareholders. The purchase price per Class B unit will be the same per Class A share price paid by the public in the approximately \$250 million underwritten secondary public offering by the sponsors concurrently announced. Hess Midstream expects to fund the unit repurchase through debt financing, which may include borrowings under its existing revolving credit facility.
Southwest Gas Holdings Inc.	NYSE: SWX	Las Vegas	\$392.5	Priced an underwritten public offering of 5.5 million shares of its common stock at a public offering price of \$74 each. Underwriters have been granted a 30-day option to purchase up to an additional 825,000 shares of common stock. Net proceeds will be used to repay outstanding borrowings under the 364-day term loan credit agreement that was used to fund the company's acquisition of Questar Pipelines . J.P. Morgan and BofA Securities are joint book-running managers. KeyBanc Capital Markets, MUFG, TD Securities, BNY Mellon Capital Markets LLC, US Bancorp and Well Fargo Securities are co-managers. Lazard Frères & Co. LLC is financial adviser.
Hess Midstream LP	NYSE: HESM	Houston	\$262.2	Announced the upsizing and pricing of an underwritten public offering of an aggregate 8.9 million Class A shares representing limited partner interests in HESM by a subsidiary of Hess Corp. and an affiliate of Global Infrastructure Partners , at a public offering price of \$29.50 per Class A share. The offering was upsized from the previously announced 7.9 million Class A shares. Underwriters have been granted a 30-day option to purchase up to roughly 1.3 million additional Class A shares at the public offering price less underwriting discounts and commissions. HESM will not receive any proceeds from the sale of Class A shares in the offering. Citigroup Global Markets Inc. and Goldman Sachs & Co. LLC are joint book-running managers.
HIF Global	N/A	Houston	\$260	Secured equity investments to fund the global expansion of its decarbonization business. Capital will be used for the development of carbon-neutral eFuels projects in the U.S., Chile and Australia that will supply ships, cars, trucks and airplanes with renewable energy. Equity investors include funds managed by globally recognized companies Porsche AG, EIG, AME, Baker Hughes Co. and Gemstone Investments . AME will remain the majority shareholder.
Aer Soléir	N/A	Dublin, Ireland	\$250	Finalizes initial commitment of equity funding from 547 Energy International LLC , the global clean energy investment platform of Quantum Energy Partners , set to support Aer Soléir, an onshore wind, solar and energy storage company, and its strategy to support Europe's ambition to become the world's first climate-neutral continent by 2050 by developing, constructing, owning and operating renewable energy projects throughout Europe.

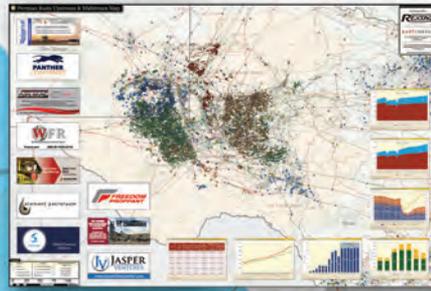
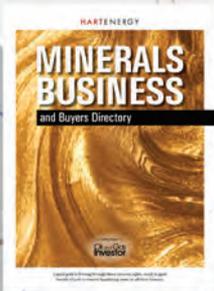
Company	Exchange/ Symbol	Headquarters	Amount (\$MM)	Comments
Archae Energy Inc.	NYSE: LFG	Houston	\$230.6	Announced the pricing of the previously announced underwritten public offering of about 13 million shares of the company's Class A common stock by an existing stockholder of the company, Aria Renewable Energy Systems LLC , at a price to the public of \$17.75 per share. Underwriters have been granted a 30-day option to purchase up to roughly an additional 1.9 million shares of the company's Class A common stock. Archaea will not receive any proceeds from the offering. Barclays and Jefferies are joint book-running managers.
Kinetik Holdings Inc.	NASDAQ: KNTK	Midland, Texas	\$201.7	Priced an upsized underwritten secondary offering of roughly 3.5 million shares of its Class A common stock by Apache Midstream LLC , a subsidiary of Apache Corp. , at a price of \$58 per share. The offering was upsized from the previously announced 2.5 million shares based on strong investor demand. Underwriters have been granted a 30-day option to purchase up to an additional 521,739 shares of Kinetik's Class A common stock. Kinetik is not selling any shares of Class A common stock in the offering and will not receive the proceeds from any sale of shares. BofA Securities, J.P. Morgan and Morgan Stanley are joint lead book-running managers. Barclays, Citigroup, Credit Suisse, Goldman Sachs & Co. LLC, Mizuho Securities, RBC Capital Markets, TD Securities, Truist Securities and Wells Fargo Securities are joint book-running managers. Capital One Securities, MUFG and Scotiabank are co-managers.
Magnolia Oil & Gas Corp.	NYSE: MGY	Houston	\$162.9	Announced the pricing of the previously announced underwritten block trade of 7.5 million shares of the company's Class A common stock by certain affiliates of EnerVest Ltd. Magnolia will not sell any shares of its Class A Common Stock in the offering or receive any proceeds from the offering. In connection with the offering, Magnolia agreed to purchase from the selling stockholders 2.5 million shares of the company's Class B common stock at a price per share equal to the price per share at which the underwriter purchases shares of the company's Class A common stock in the offering.
Project Canary	N/A	Denver	\$111	Raised Series B funding with plans to scale its core solutions and expand to new sectors as it helps companies reach a net-zero future, with a keen focus on reducing methane. Insight Partners (lead investor), Brookfield Growth, Canada Pension Plan Investment Board (CPP Investments) and Carica Sustainable Investments , the sustainable investing arm of the Hamilton James Family office, invested alongside previous backers Quantum Energy Partners, Energy Impact Partners and Frontier Venture Capital .
Summit Carbon Solutions	N/A	Ames, Iowa	\$100	Secured an additional investment from Tiger Infrastructure Partners , an original founding investor and member of its board of directors. Proceeds will be used to fund the construction of the world's largest carbon capture and storage project located within the Williston Basin in North Dakota.
Delek US Holdings Inc.	NYSE: DK	Brentwood, Tenn.	\$64	Entered into a stock purchase and cooperation agreement with Carl C. Icahn and certain of his affiliates includes the purchase of \$64 million of the company's common stock beneficially owned by the Icahn Group , at a purchase price of \$18.30 per share, which is the closing price of the company's common shares on March 4, the last trading day prior to the execution of the agreement. Under the agreement, the Icahn Group will, among other things, (i) withdraw its nomination of directors and (ii) agree to a standstill restriction through the completion of the company's 2023 annual meeting of stockholders, including refraining from acquiring additional shares of the company's common stock. Cash on hand will be used to fund the share repurchase.
Falcon Oil & Gas Ltd.	TSXV: FO, AIM: FOG	Dublin, Ireland	\$10	Received a subscription from Sheffield Holdings LP , led by Bryan Sheffield, a private placement through the issue of 62.5 million common shares at a price of CA\$0.20 each. Following the placement, Sheffield will hold a total of roughly 90.4 million common shares of Falcon, representing 8.66% of Falcon's issued and outstanding common shares. Funds will be added to the company's cash balance, giving Falcon a strong financial position well ahead of future decisions on the Beetaloo project in Australia, believed by Sheffield to be an emerging as a world class shale gas basin.
Criterion Energy Partners Inc.	N/A	Houston	N/A	Received a strategic investment from Patterson-UTI Energy Inc. Proceeds will be used to advance a first-of-a-kind geothermal energy project in Texas and further execute on its technology development roadmap.
Earthview Corp.	N/A	Longmont, Colo.	N/A	Secured preferred funding led by Dallas-based Green Park & Golf Ventures to advance the company's growth plan and meet growing demand for its continuous methane monitoring solution from upstream oil and gas producers, which are currently operating in multiple oil and gas producing regions for leading operators in Colorado, the Permian Basin, the Barnett Shale and the Appalachian Basin.
Texan by Nature (TxN)	N/A	Austin, Texas	N/A	Received investment from Hess Corp. for the expansion of the Texas Water Action Collaborative (TxWAC) , a conservation project first piloted in the upper Trinity River Basin in Texas, to the entire Trinity River Basin.

DEBT

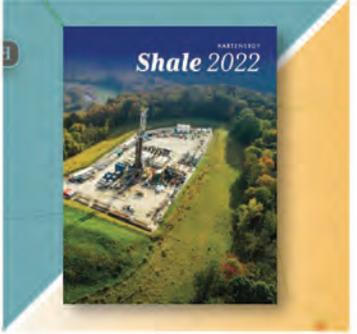
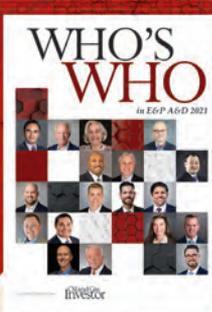
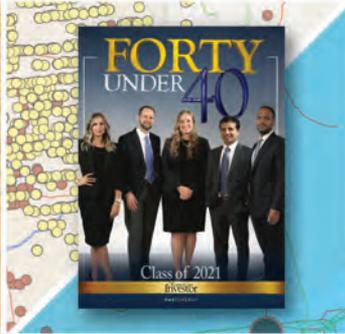
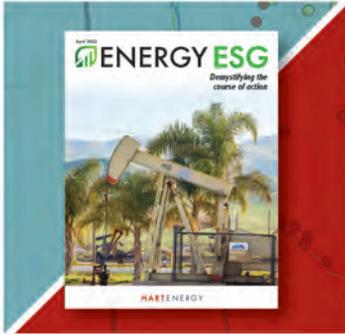
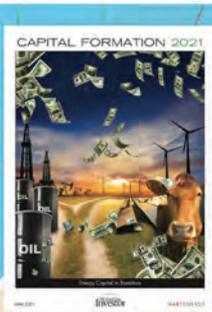
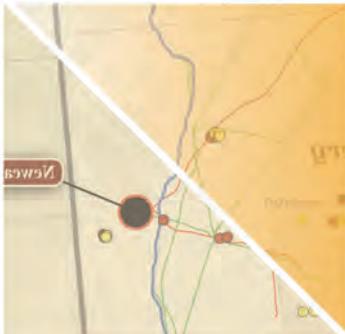
Company	Exchange/ Symbol	Headquarters	Amount (\$MM)	Comments
Strathcona Resources Ltd.	N/A	Calgary, Alberta	CA\$1,500	Upsized its covenant-based credit facility by 67% to CA\$1.5 billion, and Caltex and Stickney were amalgamated into Strathcona. Strathcona's credit facility has a maturity date of Feb. 27, 2026, with an anticipated draw of \$870 million as of March 31. Strathcona's capital structure also includes US\$500 million of 6.875% senior unsecured notes due 2026. ATB Capital Markets , BMO Capital Markets and CIBC Capital Markets were financial advisers to Strathcona on the Caltex acquisition.
Targa Resources Corp.	NYSE: TRGP	Houston	\$1,500	Priced an underwritten public offering of \$750 million aggregate principal amount of its 4.2% senior notes due 2033 and \$750 million aggregate principal amount of its 4.95% senior notes due 2052 at a price to the public of 99.815% and 99.333%, respectively, of their face value. A portion of the net proceeds from the offering will be used to fund the previously announced purchase of 5 7/8% senior notes due 2026 of Targa Resources Partners LP or the previously announced redemption of any 2026 notes not purchased in the tender offer. Remaining net proceeds will be used to repay a portion of the amounts outstanding under the company's revolving credit facility.
DCP Midstream LP	NYSE: DCP	Denver	\$1,400	Announced the amendment and renewal of its revolving credit facility, which now includes sustainability-linked pricing metrics. The interest and fees paid on the credit facility are linked to two sustainability metrics, DCP's progress toward reaching its target to reduce greenhouse-gas emissions, as published in its 2021 Sustainability Report, and outperforming midstream industry peers in safety performance. The \$1.4 billion unsecured revolving credit facility has been extended five years and will mature in March 2027. Additionally, in anticipation of the cessation of the London Interbank Offered Rate, this is one of the energy industry's first credit facilities linked to the Secured Overnight Financing Rate. Mizuho Bank Ltd. and JPMorgan Chase Bank NA were joint lead arrangers, and Mizuho acted as DCP's sustainability structuring agent.
Targa Resources Corp.	NYSE: TRGP	Houston	\$963.2	Subsidiary Targa Resources Partners LP commenced a cash tender offer to purchase any and all of the outstanding 5 7/8% senior notes due 2026. The purchase price per \$1,000 of notes is \$1,030.88, and the principal amount outstanding is about \$963.2 million. The tender offer is conditioned upon the satisfaction of certain conditions, including the completion of a contemporaneous senior notes offering of at least \$1.25 billion principal amount by TRGP on terms and conditions satisfactory to TRGP. Concurrently with the launch of the tender offer and subject to the same financing condition, the partnership is exercising its right to redeem, on April 22, any of the notes not validly tendered and purchased in the tender offer at a redemption price of 102.938% of the principal amount thereof plus accrued interest, pursuant to the terms of the indenture governing such notes. D.F. King & Co. Inc. is the tender agent. BofA Securities Inc. is the exclusive dealer manager.
Earthstone Energy Inc.	NYSE: ESTE	The Woodlands, Texas	\$550	Subsidiary Earthstone Energy Holdings LLC (EEH) priced the announced private offering 8% senior unsecured notes due 2027. The notes will be guaranteed on a senior unsecured basis by the company and EEH's domestic subsidiaries that guarantee the company's obligations under the credit agreement that governs its revolving credit facility. Net proceeds will be used to repay a portion of the outstanding borrowings under its revolving credit facility and any remainder for general corporate purposes.
Hess Midstream LP	NYSE: HESM	Houston	\$400	Consolidated subsidiary Hess Midstream Operations LP announced that it has priced 5.5% senior unsecured notes due 2030 at par in a private offering. Net proceeds will be used to repay the borrowings under its revolving credit facility used to finance the previously announced repurchase by the issuer of roughly 13.6 million Class B units from affiliates of Hess Corp. and Global Infrastructure Partners .
Holly Energy Partners LP	NYSE: HEP	Dallas	\$400	Subsidiary Holly Energy Finance Corp. , subject to market conditions, intends to offer senior notes due 2027 in a private placement. The notes will initially be guaranteed on a senior unsecured basis by the partnership's existing wholly owned subsidiaries (other than Holly Energy Finance Corp., UNEV Pipeline LLC and certain immaterial subsidiaries). Net proceeds will be used to partially repay outstanding borrowings under its revolving credit agreement.
Enservco Corp.	NYSE American: ENSV	Denver	\$13.8	Retired its \$13.8 million senior revolving credit facility with East West Bank for total consideration of approximately \$9.4 million, which includes an initial payment of \$8.4 million in cash and future payments of up to \$1 million from a limited portion of net proceeds from receivables financing. As a result, Enservco's debt was substantially reduced and predominantly reclassified as long-term liabilities with four- to six-year terms.
Enservco Corp.	NYSE American: ENSV	Denver	\$1.2	Issued as part of recent refinancing a convertible subordinated note to Cross River Partners. The note has a six-year term, bears interest at 7% per annum and has interest only quarterly payments commencing June 30.

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WHY THE SPR RELEASE IS A POLITICAL STUNT THAT RISKS NATIONAL SECURITY

The former Department of Energy counsel opines on the Biden administration's Strategic Petroleum Reserve release, saying it exceeds the White House's authority.

ARTICLE BY



MARK R. ROBECK

The Biden administration's politically motivated release, over six months, of 180 MMbbl of crude oil from the Strategic Petroleum Reserve (SPR) exceeds his authority and threatens national security.

Following the 1973 Arab Oil Embargo, Congress created the SPR through the Energy Policy and Conservation Act (EPCA) of 1975. To prevent government interference with normal market functions, EPCA specifically limited oil reserve releases when there are emergency shortages caused by a severe interruption of imported or domestic oil supply, or an act of sabotage, terrorism or "acts of God" such as hurricanes.

While all consumers are suffering from high-priced gasoline, the price increases are not due to a severe oil supply interruption. Unlike the 2011 Libya civil war, Russia's invasion of Ukraine has not caused a disruption of supplies in the world markets. In fact, the U.S. and EU sanctions on Russia expressly exempt Russia's sales of oil. Even the sanctions on Russian banks' use of the Society for Worldwide Interbank Financial Telecommunications international transaction system exclude energy sales.

Although oil prices increased partly due to reduced production in response to the economic slowdown from the pandemic, the more significant cause is the effect of the administration's regulatory assault on the oil and gas industry, beginning on Biden's first day in office when he unilaterally canceled the permits for the partially constructed Keystone Pipeline.

That was followed by suspension of new lease sales, removal of highly productive offshore and onshore tracts from future lease sales, imposition of burdensome regulatory requirements for necessary infrastructure development and proposed restrictions on capital investments in oil and gas projects.

The cumulative effect of the administration's assault on all fossil fuels, which continues unabated by the president and congressional Democrats, discourages the immense capital investment required to drill even one new well.

But the industry's response to the administration's hostility is not an emergency disruption of supply. It is exactly the response that a rational industry would make, and the response the administration intended—less investment in new development leading to less production.

Similarly, the decision to prohibit any U.S. purchases of Russian oil is not a severe supply disruption because those imports amounted to less than 5% of consumption. But even if it was more, the supply was stopped not by the war in Ukraine or by U.S. sanctions. Russia continues to sell crude oil around the world, including to its largest

customers China, India and, alarmingly, the EU.

These fundamental realities are highlighted by the International Energy Agency's announcement that the collective releases of oil is justified only by "price volatility" resulting from Russia's war and the "prospect of large-scale disruptions of Russian oil."

In short, the congressionally mandated circumstance of a "severe energy supply disruption" for the president to release oil from the SPR simply does not exist.

The upcoming midterm elections obviously motivates the administration's unauthorized action. But worse than the president ignoring the law is the threat to national security by depleting the SPR before there is a true supply disruption.

Should, for example, Iran decide the time is right, with the distraction of war in Ukraine, to pursue a show of force in the Middle East and attack Saudi Arabia, we could be facing an actual worldwide disruption of supply with a depleted reserve of crude oil in the SPR. Similarly, if a Category 5 hurricane hits the Gulf of Mexico and shuts down oil production for weeks, as with Hurricane Katrina, the SPR may not be able to respond to the actual emergency.

President Biden's pursuit of no-fossil-fuels energy policies caused high gas prices well before Russia invaded Ukraine. Now, faced with historically poor polling as the midterm elections approach, the administration has grasped for a lifeline. But the action itself exceeds the legal limits of his authority and creates unwarranted risk to our national security.

National security is no place for political gamesmanship. As President Biden flounders for solutions to the bad outcomes of his policies, we can only hope common sense secures new voices in Congress and the White House. 

Mark R. Robeck is a former U.S. Department of Energy Deputy General Counsel for Energy Policy.



ENERGY ESG

Newsletter

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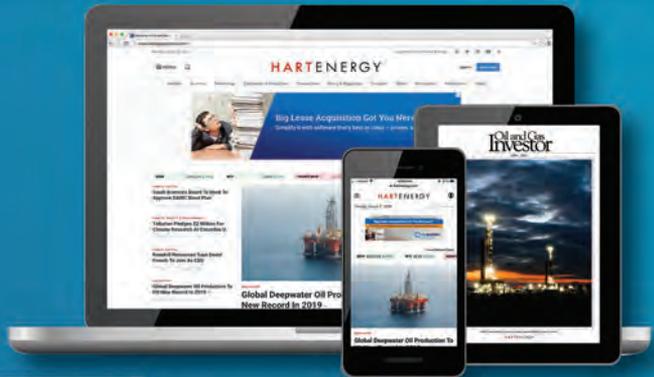
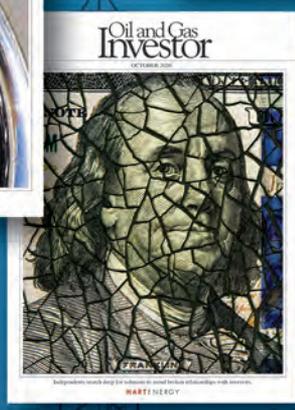
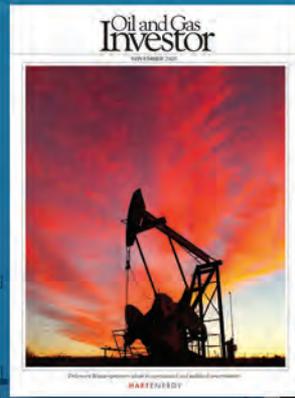
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Voices



“If the right messages were being sent to the markets, we could pick up another 200,000 to 400,000 barrels of oil per day ... North Dakota alone could provide two-thirds of the product Europe imports from Russia. It would be cleaner than Russian oil and would lessen Putin’s malign leverage over Europe.”

—U.S. Senator **Kevin Cramer** (R-ND), during a floor speech in response to White House Press Secretary Jen Psaki’s accusation that oil and gas producers are sitting on 9,000 approved, but unused, permits on leased federal lands.

Scan for more on responses to the accusations.



“Overburdensome regulations, increased taxes and anti-oil and natural gas rhetoric will only exacerbate high energy prices and raise costs for American consumers.”

—**Ed Longanecker**, president of the Texas Independent Producers & Royalty Owners Association, responding to misinformation that oil and gas companies set the market on oil prices.



“In terms of production entering into the market, we’ve seen rigs be able to be brought online much faster than we are for frac crews.”

—**Matthew Hagerty**, senior energy strategy analyst for BTU, during a webinar hosted by the firm discussing labor shortages and other headwinds to ramping up production quickly.



“Where we are now is obviously we’re going to have to produce as much as we can in the states probably for the foreseeable future, but I think we have to do it in a clean and sustainable way.”

—**Jon Rogers**, CEO of Locus Bio-Energy Solutions, also on Energy Policy Watch, discussing how technology can help U.S. producers address the oil supply crisis.

Watch here:



CONTINENTAL RESOURCES' FORAY INTO CARBON CAPTURE

The Williston Basin has the ideal properties for long-term carbon storage, Continental Resources Inc. founder Harold Hamm said at an event in Fargo, N.D., announcing the shale producer's first carbon capture project.

ARTICLE BY



BRIAN WALZEL

bwalzel@hartenergy.com

Continental Resources Inc. unveiled a \$250 million investment into a carbon capture and sequestration project in the Williston Basin on March 2 that its partners say, once in operation, will be the largest such carbon sequestration project in the world.

The Williston Basin, from which Continental has been producing for more than five decades, has the ideal properties for long-term carbon storage, according to founder and chairman Harold Hamm.

"[The Williston] has sandstone, and we've talked about the thickness of it, its consistency, its good permeability and good properties so that injectability is good," Hamm told Hart Energy. "It's better than a mile deep; it has good caprock above [the reservoir] that's going to keep the carbon in place. All of those things add up, and this has been through quite a process from a geological engineering perspective."

Hamm spoke at an event announcing the project on March 2 alongside the group leading the project, Summit Carbon Solutions, a portfolio company of Summit Agricultural Group. On hand were Continental CEO Billy Berry, North Dakota Gov. Doug Burgum, Summit Agricultural Group CEO Bruce Rastetter and Theraldson Ethanol founder Gary Theraldson.

Capturing the carbon

Summit Carbon Solutions will primarily capture CO₂ from ethanol plants and other industrial sources in Iowa, Nebraska, Minnesota, North Dakota and South Dakota. According to Summit, the CO₂ will be aggregated and transported to North Dakota via pipeline, where it will be sequestered in subsurface geologic formations. Those formations will be in the Williston Basin, where Continental Resources has been the leading producer for more than 50 years.

"We think about where we should be taking this company, where should we go next, and we have had a lot of different strategic discussions about what the things we should be focused on, what are the things we should invest in, and there are some tenets that come from what makes sense for a company like Continental," Berry

said during the event held at Theraldson Ethanol, one of the 31 ethanol plants enlisted to offload its carbon to Summit.

"We should play to our strengths and play to our core competencies."

Berry called the Summit carbon capture project a "paragon of excellence for carbon capture structure."

"I think this is a model that every government entity in the world should be looking to replicate," he said.

According to Summit, the 31 ethanol facilities will deliver more than 8 million metric tons per annum (MMtpa) of CO₂ with initial pipeline capacity of 12 MMtpa and expansion capabilities to handle up to 20 MMtpa.

Rastetter said that beyond the initial 31 ethanol plants, his group is working to secure commitments from other high CO₂ emitters in the upper Midwest, such as coke and fertilizer facilities.

"This project will cut ethanol's carbon score in half," he said. "And with the improvements that are going on in agriculture that we all know, which leads to increased yields, less nitrogen yields and producing more with less and with greater sustainability, that's how plants have a long-term opportunity at net-zero carbon."

Doing the right thing

Berry said that Continental's first investment in a CO₂ sequestration project such as Summit's aligned with both the company's long-term vision, and the desires of its shareholders and investors.

"We're in the liquid fuel business, and the byproduct of liquid fuel is greenhouse gas, and greenhouse gas



Continental Resources Inc. founder and chairman Harold Hamm spoke at an event announcing the project on March 2 alongside the group leading the project, Summit Carbon Solutions.

needs to be mitigated. We're all looking at what we can do to decrease carbon intensity," he said. "So, it was easy for us to say this is a project where we can invest our efforts to continue to reduce greenhouse gas. Our company is down 40% on greenhouse gas [emissions] since 2016, so this is just a continued effort on our part to go out and do the right thing. It's the right project at the right time with the right partners and the right government support."



“The Summit carbon capture project is a paragon of excellence for carbon capture structure.”

**—Bill Berry,
Continental
Resources Inc.**

Burgum explained that the Summit project is just the latest in carbon management efforts his state has supported, having been one of the first states in the country to capture and transport CO₂.

“We’ve been capturing CO₂ in North Dakota since the 1980s and putting it in pipelines and shipping it up to Canada,” he said. “So, we know a little bit about CO₂ in North Dakota, but this is going to be the largest [project]”

ENBRIDGE'S CCUS STRATEGY

Carbon capture, utilization and storage (CCUS) is said to be a source of promise for many oil and gas producers and midstream companies looking to help lower global emissions and reduce their carbon footprint.



Adam Chalkley

One pipeline operator, Enbridge Inc., plans to build and operate its own hub in Alberta, Canada, named the Open Access Wabamun Carbon Hub, Adam Chalkley, director of low-carbon development at Enbridge, told Hart Energy.

“Our role will be to transport and safely and permanently sequester the CO₂ from Capital Power and Lehigh Cement facilities in the area. Capital Power and Lehigh Cement will be responsible for CO₂ capture at their respective sites,” Chalkley said. “Four Treaty-6 First Nations in Alberta, along with the Lac Ste. Anne Metis Community, will have an opportunity to co-own the carbon transportation and sequestration projects associated with the hub.”

Preliminary siting work was already underway by March.

“Our focus is on delivering cost-effective carbon transportation and storage that minimizes infrastructure footprint to protect land, water and the environment,” Chalkley said. “Accordingly, we’ll be seeking to build transportation and storage infrastructure as close as possible to CO₂ emissions sources in the region. It will be a greenfield, purpose-built infrastructure.”

At the end of the pipe, injection and monitoring wells will be used to sequester and monitor CO₂ in saline aquifers at depths of up to 3,000 m. The Enbridge hub is focused solely on transportation and permanent CO₂ storage with no plan for reuse.

While good carbon management programs help facilitate a social license to operate, any such project needs to offer a value proposition, and Chalkley explained that Enbridge’s projects provide strong economics.

“In our view, low-cost, high-quality transportation and sequestration increases the likelihood that more capture projects move

forward,” said Chalkley. “And that is best achieved by a take-or-pay utility model very similar to how our oil and gas pipelines are operated.”

That said, governments at several levels are willing to participate with some support, whether direct funding, tax credits or other considerations.

“Launching CCUS will require collaboration, and governments will have a role to play,” Chalkley said. “We continue to have conversations with governments at various levels and share the view that a broad-based, full value chain tax credit is critical to attracting serious investment into CCS in Canada.”

Enbridge said the system will be in operation in 2025, according to company press releases.

“The first step is securing CO₂ sequestration rights from the government of Alberta, likely later this year,” Chalkley explained. “We will then need to secure an evaluation permit from the government of Alberta and then a sequestration lease. We are advancing regulatory steps to meet the milestones needed for Lehigh Cement, with a target in-service date as early as 2025; and Capital Power, with a target in-service date as early as 2026.”

While those are the launch customers, Enbridge is seeking other shippers, as would any other midstream firm eager to fill capacity on any other kind of pipeline.

“Our Wabamun Carbon Hub is open access and available to all nearby emitting facilities,” Chalkley said. “There are approximately 25 mtpa [million tonnes per annum] of CO₂ in the Wabamun area, Edmonton and Fort Saskatchewan combined, and we’re regularly engaging with companies looking for low-cost, high-quality CO₂ transportation and sequestration.”

By the nature of its business model and operational plan, the Wabamun Hub is very much a commercial project. At the same time, it cannot help but also be a proof-of-concept endeavor. Chalkley is hopeful but circumspect about what might come next.

“We are evaluating and developing several CCUS projects across our North American footprint and will have more to say on that as opportunities mature and develop,” he said.

—Gregory DL Morris

WHERE'S THE VALUE IN CARBON MANAGEMENT?

Setting out on a net-zero path means energy companies committing to a carbon management strategy since there is no pathway to net zero without substantial carbon emission reductions.

While managing carbon emissions provides energy companies with a social license to operate while also appealing environmentally conscious capital investors, there is an economic case to be made for carbon management operations. Between the federal 45Q tax credit and both voluntary and regulated carbon markets, enough financial incentives have emerged to make the value proposition for carbon management appealing.

"There is a growing number of projects that actually do produce a very respectful return, in the context of the carbon capture challenge," said Nick Fulford, senior director, gas/LNG, carbon management, energy transition, Americas, for GaffneyCline.

"We're talking about absolutely the tip of the iceberg at the moment," Fulford continued. "In volumetric terms, we're talking about a handful of tons per annum of carbon in a challenge which lowers hundreds or thousands of times that, which will ultimately have to be addressed. But that's really where the investment case is coming from."

Offsets and credits

As Tim Romer, CFO and head of strategy for Project Canary, explained, it is impossible to eliminate emissions down to zero, so companies with a net-zero goal in mind need to acquire carbon offsets. This is where carbon markets come into play.

"You have to measure the emission, you have to reduce the emission, but for those emissions that can't be reduced to zero, you have to have an offset," he said.

Romer explained that there are several types of carbon markets throughout the world, selling and trading credits and offsets, such as in California, which has adopted a regulated market through cap-and-trade.

"Those trade at a value, and there's also a voluntary market of offsets, which is a little bit evolving in nature," he said.

Regulated markets are more active in regions where there exist government regulations for emission reductions, such as in Europe and in California, where voluntary markets exist where there are fewer regulations, such as in most of the U.S.

"The value of those voluntary offsets is really dependent upon who is the registry and who is the certifier of what the offset is," Romer said. "And then the other way to create an offset is through carbon capture. So, the value proposition to all these companies is we know there's going to be some emissions that you can't reduce.

"We think carbon capture is an economic means relative to purchasing offsets to reduce emissions. So, what they're trying to do is provide new means by which to capture and then sequester those emissions that can't be reduced, that way you get to net zero."

Regional approaches

Fulford explained that the value proposition for carbon management often varies on global regions, the regulatory landscape and investment frameworks. For example, in the Middle East, where economies are most energy-intensive, there has been a realization of an "existential challenge."

"If they don't adopt and somehow transform into a low-carbon energy consumer or producer, then there's a generational problem for people going forward because the whole country's economy hinges in some around energy production," he said. "The value proposition is absolutely long-term survival."

In Europe, there is a greater sense of social engagement with climate issues.

"There's an acknowledgment that the energy transition will have a cost associated with it, which needs to be borne appropriately across society, which might mean taxes or subsidies or other ways to address carbon in a noncommercial way," he said.

The value proposition for carbon management in the U.S., according to Fulford, is reflective of the way in which the country's economy has functioned, as well as how the oil and gas economy has worked.

"Which is, if something doesn't generate a financial return, then why would you do it?" he said. "In the U.S., the challenge is around a sustainable investment case."

GaffneyCline has seen a "significant uptick in serious money" being invested into the carbon management space, he added. But with those investments comes an understanding that, in many cases, "an amount of money will have to be deployed without that clear, sustainable investment case that normally would exist."

Opportunities in sequestration

In terms of value creation, carbon sequestration offers perhaps the most opportunities.

Large carbon emitters, such as ethanol plants, can pay third parties to capture and sequester their carbon. Those emitters can then earn 45Q tax credits—currently \$50/metric ton stored underground—or sell carbon offsets on the market. Meanwhile, those third-party companies generate revenue from the emitters, such as ethanol plants, to capture and sequester their carbon.

"Ethanol plants are [in] a place where they feel like there's a real value proposition to carbon sequestration because you need to burn fossil fuels to create the ethanol," Romer said. "If you can capture those emissions, it makes that ethanol a cleaner product. They can't reduce emissions to zero, so they go to offsets. So, what are their choices in offsetting? They either go buy offsets or they pay somebody to capture their carbon and put it back in the ground."

As Fulford explained, processes such as ethanol, ammonia and some types of natural gas reforming utilize a high-pressure stream of CO₂, which is readily capturable and represents a profitable prospect under the 45Q credit program.

“Beyond that, any sort of post-combustion capture, whether you’re looking at a refinery or a power station or a purpose-built hydrogen plant, the technologies are still relatively inefficient,” he said. “The capture process itself has a very high energy price to pay.”

Active projects

In terms of sequestration, projects that are currently offering strong economics are those along the Gulf Coast corridor, Fulford said.

“Given the geological understanding of the area and the existence of large saline aquifers, the investment case around a significant sequestration project is quite robust, provided you can secure a supply of CO₂ to put in it,” he said. “You can see that there are projects emerging purely on the sequestration side that have managed to secure a supply contract that produces a respectable return.”

Talos Energy is one operator that is making a substantial investment in carbon capture and sequestration (CCS) along the Gulf Coast. The offshore producer has so far announced three CCS projects for which it is at least a 50% operating partner—two in Texas and one in Louisiana.

The Bayou Bend CCS project, a venture with Carbonvert, includes a lease agreement with the Texas General Land Office for a CCS site located offshore Jefferson County, Texas, near the Beaumont and Port Arthur industrial corridors. According to Talos Energy, the lease comprises more than 40,000 acres adjacent to the corridor with an estimated capacity of 225 million to 275 million metric tons of CO₂.

The Coastal Bend Carbon Management Partnership is a venture between Talos Energy and Howard Energy Partners for CCS opportunities on site at the Port of Corpus Christi.

The project and lease option agreement encompass about 13,000 acres for CCS project evaluation, with an initial goal to sequester 1 million to 1.5 million metric tons of CO₂ per year into saline aquifers.

The River Bend CCS project includes an agreement with a large Louisiana landowner to lease about 26,000 acres along the Mississippi River industrial corridor for future CCS projects. The project includes 26,000 acres leased in Iberville, St. James, Assumption and Lafourche parishes, which, according to Talos, emit about 80 million metric tons of CO₂ per year.

The sequestration project comprises three sites with a cumulative storage capacity of more than 500 million metric tons, according to Talos Energy.

‘A seat at the table’

With the multitude of international carbon markets and the wide disparity in carbon prices in those markets, many aspects of the economics of carbon remain to be settled. Fulford explained that in some ways, the early days of the carbon management industry reflect that of the onset of the shale revolution in the sense that profitability was clear, but getting to that point was initially unclear to many new entrants.

“There is a price to pay for having a seat at the table and generating experience,” he said. “There are some parallels with the shale gas revolution where a lot of people got interested at the point where it was clear that money was going to be made but not so much how. From the projects we have worked on, the financial case, the risks, the normal commercial drivers often are either absent or remain to be proven much more than any other category of energy project. But there are a small number of projects now that are proving profitable.”

—Brian Walzel



Ethanol production requires large amounts of energy, resulting in large amounts of CO₂ emissions. Analysts believe facilities such as this ethanol plant can generate strong economics in CCS through carbon markets or 45Q tax credits for sequestration.

Theraldson Ethanol is one of 31 ethanol plants located in the upper Midwest to join Summit Carbon Solutions' carbon capture and sequestration project. The facility produces more than 150 million gallons of ethanol a year.



BRAN WANZEL

of its kind. This project has the potential to capture and permanently store over 12 billion tons of carbon dioxide across that 2,000-mile pipeline. That's like taking 2.6 million cars off the road."

To help facilitate a project like Summit's, Burgum explained that North Dakota has worked over the past several years to earn primacy over carbon injection wells, or Class 6 wells.

"Anybody who knows anything about building a pipeline knows that it's gotten so political. [It matters] who is in the White House with an executive order," Burgum said. "If you're [Rastetter] and you are trying to raise capital for a project and you can't tell your investors that you're going to be able to get a permit or not, it's pretty hard to raise capital. [Rastetter] knows that if he follows all the rules in North Dakota, and we've got extensive rules, just as Harold [Hamm] knows, we've got a great regulatory environment for oil and gas, and we've got some of the cleanest air and cleanest water in the country."

Jeff Hume, Continental vice chairman of strategic growth initiatives, added that the sequestration reservoir holds large quantities of saline water and is more than 300-ft thick with 25% porosity.

"We're on the eastern side of the Williston Basin, so away from oil and gas activity," he said. "That puts us away from existing wells, so we have a minimal amount of penetration out here. We've got a very good control on the sandstone that has been drilled, 3-D seismic has been shot. [Rastetter's] team is even seeing a little bit better reservoir thickness than we thought from the seismic. They're drilling test wells now and getting samples cores from that."

Lowering ethanol's carbon score

Theraldson Ethanol was founded by Gary Theraldson, who made his fortune as an hotelier, eventually accumulating more than 350 properties in his career, selling nearly half of them to Goldman Sachs for \$1.2 billion. He founded the

ethanol facility in 2008, which produces 150 million gallons of ethanol annually.

As Berry explained, ethanol traditionally emits a high concentration of CO₂ during processing from corn to liquid fuel.

"Where do you go after the CO₂?" Berry said. "It's the high-concentration, low-cost capture, and ethanol plants fit that."

Hume said projects such as the one being led by Summit are the fastest way to lower the carbon score of an ethanol plant. He added that fertilizer plants that are looking to offload their CO₂ could experience repeat valuation.

"If your fertilizer plant gets decarbonized, and the fertilizer goes back in the ground, that's fertilizing the corn, then that corn that's coming in the plant's got a lower [carbon] score, then that lowers the score even more," he said. "So, there's a virtual cycle the way the carbon scores go if you can decarbonize the inputs into the growers."

Rastetter said the Summit sequestration should be underway by the spring of 2024.

"We are in the process of permitting about 2,000 miles of pipeline and doing all the engineering work both at the plants and with the compression equipment, and then the pipeline, bidding the pipeline project to four or five companies, and are actively engaged in signing up landowners on the carbon sequestration side west of Bismarck," he said.

Rastetter said more than 90% of landowners potentially impacted by pipelines and injection wells have signed up for the project, representing about 150,000 acres in the area. 

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LEADING THE WAY IN CARBON MANAGEMENT

Carbon capture is definitely part of the game plan for oil and gas companies as new projects rapidly emerge. However, more reliable technology and policy support are required to ensure the industry's success.

ARTICLE BY
ANNA KACHKOVA

The issue of carbon management is increasingly a priority for the oil and gas industry as well as more broadly. The energy transition is accelerating, bringing with it pressure to decarbonize more rapidly, but at the same time energy demand is rising, and fossil fuels are still required to help meet those needs.

Against this backdrop, oil and gas companies are having to strike a balance between decarbonizing and continuing to produce fossil fuels. And the more oil and gas they wish to produce over the longer term, the more important carbon management tools, particularly carbon capture and storage (CCS) and carbon capture, utilization and storage (CCUS), will be.

"Most of the E&P companies, especially oil majors, consider CCUS a critical carbon abatement tool to fulfil respective net-zero targets," said Yvonne Lam, head of CCS research for Rystad Energy. "And these energy companies are estimated to spend a significant part of their total capital expenditure on low-carbon business ventures over the next five to six years, including CCUS."

Companies have different strategies for reaching their decarbonization goals, Lam noted, and therefore it is difficult to say how much CCUS will dominate their carbon management plans. She added, though, that hydrogen and CCUS feature far more heavily in E&P players' plans than other low-carbon investments such as wind and solar.

"CCUS is definitely part of the game plan and the low-hanging fruit for oil and gas companies," she said.

CCUS challenges

The E&P sector has been an early adopter of CCUS, both using CO₂ in EOR and sequestering it in underground reservoirs. While interest in utilization of CO₂ for EOR and other applications remains, the majority of proposed CCUS projects are aimed at permanent sequestration.

"CCUS is definitely part of the game plan and the low-hanging fruit for oil and gas companies."

—Yvonne Lam,
Rystad Energy



The approaches companies can take to CCUS are varied, and while some of the technology involved has been proven, other types have some way to go yet.

"There is a substantial amount of new and innovative ways in which you can capture CO₂— too numerous to discuss," technology firm Delta CleanTech's executive chairman, Lionel Kambeitz, told Hart Energy. "Most are what we would classify as 'science experiments,' as they have not yet proven to be commercially viable from a capital and/or operating point of view."

Canada-based Delta specializes in post-combustion CO₂ capture, among other areas relating to clean energy technology.

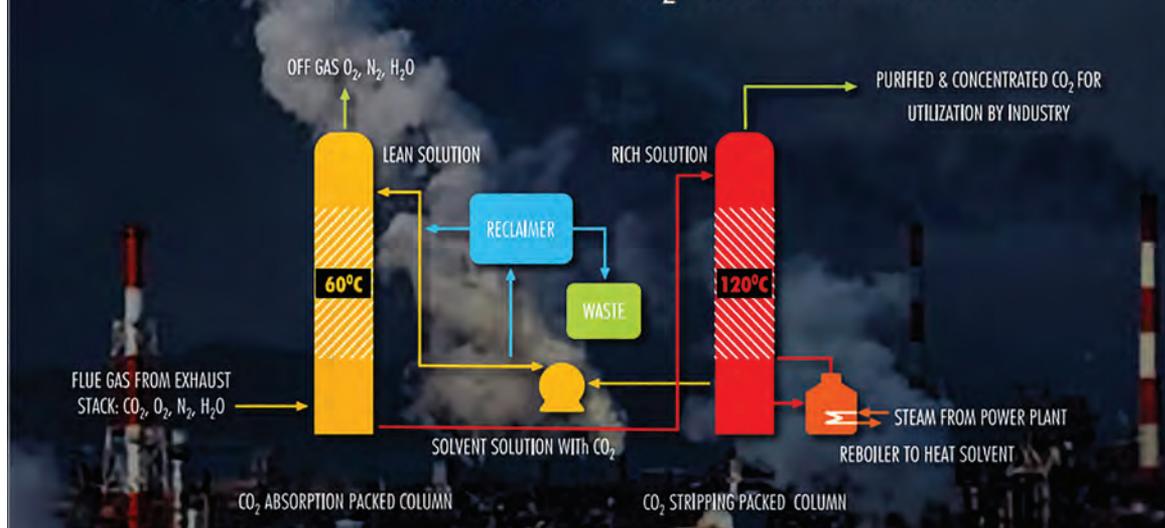
"Delta and three of four of its main international competitors use a variation of the post-combustion CO₂ capture process using mixed solvents," Kambeitz said. "This is a proven technology and has been used by most of the largest CO₂ capture projects in the world to date."

Delta's process has become more efficient over time.

"We have taken a new CO₂ capture process—post-combustion capture using formulated solvents—and modified and improved the process," Kambeitz said.

"Like anything, if you do it enough, you can improve the process over time. We have reduced the capital costs by up to 40% and the operating costs by up to 30%."

Large and small companies working on CCUS alike will similarly be striving to improve processes and cut costs. The growing number of players participating looks set to accelerate the technological advances that will be required to improve the economics of CCUS.

PROCESS INTEGRATION — CO₂ REMOVAL PROCESS

Source: Delta CleanTech

Delta CleanTech's technology removes carbon from emissions and processes CO₂ for use by the industry.

Lam also noted the variety of technologies that are becoming available to CCUS developers.

"There are multiple separation technologies available in the market today," she said. "Chemical and physical absorption is the most matured and widely used technology, while others, such as membrane separation, cryogenic separation, chemical looping and adsorption separation, are the emerging technologies."

Newer technologies that have yet to be proven include direct air capture (DAC), which is in the spotlight thanks to a DAC plant that Occidental Petroleum Corp. is developing in the Permian Basin.

"There's definitely a long way to go for direct air capture technology, but for traditional CCS, we already have mature technology that we could use today," Lam said. She warned, however, that even more mature technologies had a long way to go in terms of achieving the economies of scale required to meet 2050 net-zero targets.

There are various other obstacles for the oil and gas sector to overcome as well as it works to accelerate carbon capture.

"The biggest challenge currently is not how to capture the CO₂ but rather what do you do with the CO₂ once it has been captured," Kambeitz said. Citing the example of Canada, he added that both provincial and federal governments there were taking steps to help mitigate the cost of CO₂ capture as well as trying to provide commercial uses for captured CO₂.

Another challenge is the, so far, underperformance of CCUS facilities once they come online. A high-profile example is the CCS project serving the Chevron-led Gorgon LNG terminal in Australia. Chevron said in July 2021 that the CCS system had captured 5 million tonnes of CO₂-equivalent since starting up in August 2019. This was about 5.2 million

tonnes short of the facility's capture targets by that date, not helped by technical challenges that had delayed its start up by more than two years.

The Gorgon facility's underperformance has raised concerns over other CCUS projects failing to meet carbon capture targets.

"We do see that the capture rates for operational projects fail to meet their targets," Lam said. "This is because companies announced their maximum capture and storage capacity to attract investment, but these capacities are subjected to multiple risks involved, such as maintenance of the plant, technical failure or unexpected problems from wells in the case of the Gorgon project in Australia."

According to Lam, Rystad generally expects CCUS facilities to have 70% to 80% capture rates rather than the 90% to 95% that companies announce.

Survival of the fittest

Not all companies will be able to overcome these and other challenges. Many of the new projects announced in the past couple of years have had few details worked out thus far. As a result, it cannot be ruled out that they will ultimately be found to be uneconomic.

"In general, we assume that 30% of the announced commercial projects will not move ahead as planned, but cluster projects [large-scale CCS hubs] have a higher chance of moving forward because of government support in building infrastructure, as well as getting the necessary permits for CO₂ storage," Lam said.

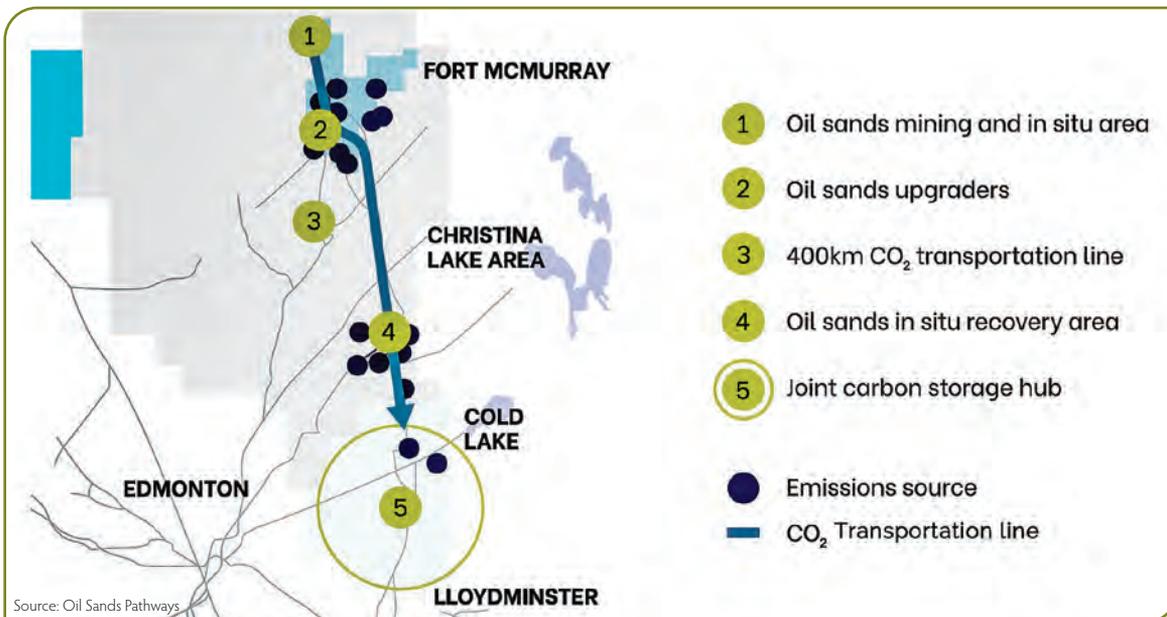
Oil and gas companies are mainly involved in the transportation and storage side of such hubs, she noted. And while the CO₂ could come from oil and gas operations, there are also initiatives underway in which E&P players are proposing to sequester CO₂ on behalf of other industrial emitters.

Last year, more than 50% of the projects announced were cluster projects, according to Lam.

"For cluster projects involving emitters with lower margins, the incentives or investments they could receive will determine if the project will move ahead," she said.

Regions that are being targeted to be potential CCUS hubs include Canada's oil sands and the U.S. Gulf Coast, and there are also several separate hub developments underway in Europe. These developments are being spurred in

Oil Sands Pathways' Carbon Capture Network



Oil Sands Pathways' carbon capture network includes capturing CO₂ at several emission sources near a transportation line, with eventual permanent storage at a hub east of Edmonton, Canada.

part by favorable local policies, according to Lam, who said Rystad also sees significant potential for the Middle East and Southeast Asia to become major CCUS hubs thanks to their storage potential in saline aquifers.

Inpex's plans

One of the hub proposals currently being advanced would take place in Darwin, in Australia's Northern Territory. The Commonwealth Scientific and Industrial Research Organisation, a government organization, will lead a consortium that also includes the Northern Territory state government and several energy companies to develop the business case assessing the viability of a Darwin CCUS hub.

Japan's Inpex, Italy's Eni and Australian firms Woodside, Santos, Origin Energy and Xodus Group have all committed to collaborating on the business case.

"The hub concept is not a single project; it offers the potential to develop a series of linked investments forming a multi-industry, low-emissions CCUS hub," an Inpex spokesperson told Hart Energy.

Inpex is the operator of the Ichthys LNG terminal near Darwin, where it is planning to build a CCS facility. Under the company's Vision@2022 plan, unveiled in February, it will launch CCS at Ichthys in the late 2020s, initially injecting 2 million tonnes per year of CO₂ through the project.

"Much work has already been carried out to evaluate options for geo-sequestering CO₂ emissions from the

Inpex-operated Ichthys LNG project. Ichthys LNG's onshore facilities feature dedicated plot space and tie-in points for future CCS facilities," the spokesperson said. "For disposal we believe the Petrel sub-basin, in the south-east portion of the Bonaparte Basin offshore northern Australia, has great potential as a storage aquifer."

Inpex is working to bring its Scope 1 and 2 emissions down to net zero by 2050. Under the Vision@2022 plan, the company will operate five "net-zero businesses" alongside its core oil and gas business.

"The five net-zero businesses include hydrogen/ammonia, CCUS, renewable energy, methanation and forest conservation," the spokesperson said, adding that these were not necessarily listed in order of priority.

Within the CCUS business, Inpex is targeting CO₂ injection volumes of at least 2.5 million tonnes per year in 2030 and promoting technical development and commercialization of relevant technologies.

"Key initiatives include a CO₂ EOR demonstration project in Niigata, Japan, a CO₂ EOR scale-up in Abu Dhabi in the UAE and CCS implementation" at Ichthys, the Inpex spokesperson said. Indonesia is another country

where the company is collaborating on CCS development.

Inpex anticipates a need to study and improve both the technology and economics involved in CCUS in order to facilitate its large-scale development.

"From a technological standpoint, challenges include developing technologies to evaluate reservoirs suited to CO₂

“There is a substantial amount of new and innovative ways in which you can capture CO₂—too numerous to discuss. Most are what we would classify as ‘science experiments.’”

—Lionel Kambeitz,
Delta CleanTech



storage and reduce operational costs," the spokesperson said. "From an economic standpoint, the challenge lies in mapping economic projections. This is due to the high degree of uncertainty resulting from the various necessary steps involved in developing large-scale CCS, including conducting research and development and demonstration tests, and developing supply chains."

The spokesperson also noted that there could be regulatory challenges, citing Japan, where CCS developers currently "lack an environment conducive to business expansion." This could be remedied, however, by a "comprehensive regulatory system facilitating subsurface permit acquisitions and policy support in the form of subsidies or tax incentives," the spokesperson added.

Canadian alliance

Inpex is far from alone when it comes to calling for government support for CCUS initiatives. Similar calls have been made by oil and gas companies globally as they unveil increasingly ambitious project proposals.

In Canada's oil sands—another region where a major CCUS hub is under development—a group of leading producers is also counting on government support to help realize its carbon capture plans.

The Oil Sands Pathways to Net Zero Alliance, formed in 2021, comprises Sunco Energy, Cenovus Energy, Imperial Oil, Canadian Natural Resources, MEG Energy and ConocoPhillips Co. Together, they account for around 95% of Canada's oil-sands production.

The alliance is targeting net-zero emissions from the companies' combined oil-sands operations by 2050, and CCUS is expected to play a key role in achieving this.

"The foundational project of the Pathways Alliance is a carbon capture network," Pathways Alliance spokesperson Alain Moore said. "At the heart of the network is a proposed carbon transportation line to gather captured CO₂ from more than 20 oil-sands facilities [more than 10 initially] and move it to a proposed hub in the Cold Lake area of Alberta for storage."

Members of the alliance would be both co-investors in the pipeline and hub and its customers, and the line is also expected to be available to other industries in the region interested in capturing and storing their CO₂.

"Because of the amount of capital investment required to build carbon capture and storage infrastructure, the countries that are doing this successfully are all using a collaborative model where governments are providing financial support alongside industry, which range from covering two-thirds to three-quarters of capital costs," Moore said. "Governments in Canada understand this, and we're working with them to find a similar made-in-Canada approach to meet our climate goals."

The alliance has welcomed federal plans for an investment tax credit for CCUS, though the government has yet to decide how much

it will be willing to offer to the industry. Moore added that in addition to such incentives, it was also essential for governments to develop enabling policies, fiscal programs and regulations that provide certainty for investors.

"For example, guarantees for availability of carbon sequestration rights, emissions reduction compliance credits and ongoing investment tax credits" could be among these, Moore said.

The oil-sands region is already home to operational CCUS infrastructure, and the alliance is confident that these projects and others under construction in Europe bode well for building more such CCUS capacity.

"The proposed Pathways carbon capture network is similar to large carbon capture projects already underway in other progressive oil producing nations such as Norway and the Netherlands, where industry and government are working together to reduce CO₂ emissions from industry," Moore said. "Canada and Alberta also have demonstrated technological prowess for CCUS with both the existing Quest project and the Carbon Trunk Line. So, we are confident current and emerging technologies can get the job done."

Moore noted that Pathways companies may also have different carbon streams relating to operations beyond the scope of the alliance. Within the alliance, though, a team effort will be required.

"Much like when the Canadian Oil Sands Innovation Alliance was founded 10 years ago, it is vital that we continue to share technologies and best practices that will allow us all to accelerate the pace of improvement in emissions reduction," Moore said.

Looking ahead

Such collaboration among industry players and other stakeholders will be vital to help scale CCUS.

"By collaborating with other companies, they will not only leverage their existing skills, they will also help share the risk in developing these projects," said Rystad's Lam. She cited the Gulf Coast as an example of another region where this is happening. She also sees potential for more partnerships where oil and gas companies sequester CO₂ for other industrial emitters, which do not have expertise with the transport and storage of their emissions.

"Opening up CO₂ storage for other players will definitely help to push up the success rate and deployment of CCS projects," Lam said.

In the longer term, she sees DAC as "crucial" if the Paris Agreement goal of limiting the increase in global temperatures to 1.5 C is to be met.

"We will definitely need to rely on oil and gas this decade," Lam said. "Despite the rapid deployment of renewables, it is still not enough to cope up with global energy demand."

In this scenario, "it is certainly better for the companies to include CCS for new oil and gas projects whose CO₂ would otherwise be vented," Lam said.

Rystad recently announced that it expects service sector spending on CCUS to quadruple between 2022 and 2025, topping \$50 billion on a cumulative basis over that period. But Lam said that the consultancy anticipates the share of CCUS used by the oil and gas industry to taper off from 2035, while emerging technologies such as DAC take up an increasing share from that point. This, however, is still a long way off. 

YESG-CENTRIC!

Blackbuck Resources CEO Justin Love discusses his company's ESG-focused strategy and initiatives to overcome water management challenges in the Permian Basin.

ARTICLE BY



FAIZA RIZVI

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Blackbuck Resources LLC founder and CEO Justin Love is working on several initiatives that are aimed to overcome the challenges of water recycling in the shale patch.

Formed in 2018 with equity backing of Dallas-based Cresta Fund Management, the Houston-based company was created in response to water management solutions gaining momentum to design, build and operate water infrastructure in Texas and New Mexico.

In an interview with Hart Energy senior editor Faiza Rizvi, Love, who said ESG is at the core of his company, talked about a case study of a first-of-its-kind implementation of an energy recovery device at Blackbuck's disposal facility in New Mexico, which generates electricity from kinetic energy and reduces the company's overall energy use and carbon footprint.

Blackbuck is also working on a whitepaper that outlines its strategy that they're calling "H2Zero" to leverage water disposal infrastructure in the Permian Basin.

Faiza Rizvi: *U.S. oil and gas producers are being asked to ramp up their output to address energy security concerns. Now, more drilling, of course, means more produced water. There's more need for water recycling. As a water midstream provider, which is ESG-centric at the core, how is the current situation impacting your company?*

Justin Love: It's interesting. I think there are some signals in the market to increase production. Those companies that are beholden to Wall Street might have different signals. I think the only thing they're really being asked to do is pay dividends and buyback shares and live within their cash flow, which means no growth or low growth. But on the private side in particular, I think the commodity price and the macro is signaling a big tailwind and increasing activity.

When our customers are ramping up, we're obviously constantly looking to ramp up to meet their needs in terms of capacity. The good news is, with

recycling being a bigger part of what we and companies like Blackbuck do, there's obviously more water with more production. But you also have more completion activity. And so more places to put it from a recycling standpoint.

We're dynamically looking at how we can better serve them, build infrastructure to link producers and completions together. And it's a dynamic exercise, but in short, we're seeing an uptake in activity.

FR: *Blackbuck has a lot going on in terms of its ESG activities. The company is running a case study on an energy recovery device at one of your disposal facilities.*

JL: That's right. Last year, we partnered with the startup company. And we

noticed that, if you look across the Permian, I think there's north of 20 million barrels of water moved through pipeline and other means a day. And increasingly on pipeline and not on trucks. And to pump water through a pipeline over a distance, whether it's uphill or across a swath of land, you have pressure.

And so, these pumps are imparting pressure into the water. But when you get to a central facility, be it recycled or disposal, you lose that pressure. And so, there's kinetic energy that is lost in the process, and it happens everywhere. I mean, anytime you put water from a pressurized pipeline into a tank, poof, the energy's gone.

And so, we got wise to this, and I have a history of working with water tech startups. We partnered with a group and installed the first of its kind. It's an energy recovery device on one of our facilities in Eddy County, N.M. And we're collecting data this year. We have goals to do one of these major implementations every year, but we're really excited about the potential because you have this wasted energy, which then converts to electricity.

It costs you nothing because the water's going into the tank anyway. You recover that pressure. You convert it to electricity, and you use it to power your facilities. And so ultimately, you can lower your footprint as far as energy needs are concerned.

FR: *I read that you are working on a very interesting wastewater disposal strategy. It's called the H2Zero, which is related to the connectivity of infrastructure in the Permian Basin. Can you discuss more about the strategy?*

JL: It's a pretty broad and big idea, and it has a basis in history. We're working on a paper right now to tell a story from the 1940s that we find really interesting and related. Stay tuned for that. But if you look at the water infrastructure environment in the Permian, what I see as the biggest inefficiency is that you have these little islands that are spiderwebs of captive infrastructure as it relates to water.

And so, when you limit the size of that island, you only have so many needs for recycling on the system. And obviously, there's produced water on a system that's



“You start to find opportunities at scale, where you can implement what I’ll call more progressive technologies.”

going to stay there for a long period of time. What we're proposing, especially in the western Delaware, where our largest footprint is, is to find means of connecting these little spiderwebs or islands of captive water infrastructure with interconnecting infrastructure. That's the first step is create connectivity between these developments.

The second step is to hydraulically balance that new, larger-scale regional system. And so, what you're doing is, you basically created a larger area for these water molecules to travel. Water in the south might be water out 100 miles away. And as you do that, you'll gain access to more development, which is transient. Operators move, and different hot areas start getting developed.

And you usually have water where you don't because you've produced water there, and you usually need water where you don't have it because it's a development. And so, I think in doing this H2Zero strategy, the idea is that one, we minimize disposal in general. We know that in certain cases, disposal can be linked to seismic risks. We know that it's [a] consumptive use of water. And so, recycling as a primary form of disposal is the goal. And to do that, you have to access development so that you now have a larger recycle network further, as you start to manage your utilization of disposal, call it as a relief valve. Because completions are the priority and recycle, you start to find opportunities at scale where you can implement what I'll call more progressive technologies. And so, we've coined a term called a "water refinery." I was in a meeting here in Houston with a company to look at some of these parameters on how far you can actually condense your produced water stream.

Let's say you've maximized your recycling, and you're going to all the completions in your region and you still have a little bit of disposal. It's not quite balanced. Well, you can reduce that disposal further by essentially distilling a portion of the water that's being disposed. You won't be able to completely crystallize it feasibly because then you end up with a solids problem. There's a lot of salt in this water.

And if you were to crystallize it, one, it would be expensive. And two, you'd end up with the solid waste. Moving rail cars around is a lot harder than pumping stuff through a pipe. And you basically move the problem into a bigger problem. But what you can do is you can implement a distillation, which takes your salinity in the water

up. [It] creates a freshwater stream, which has value. And then, now that you have a condensed reduced stream, one, you can inject it in disposal, and you've lowered your amount of injection. Or two, what the water refinery concept looks to do, is you can implement processes to extract value from that brine.

We've been studying our water for several years now. And especially in the western Delaware, we see higher concentrations of things like lithium, strontium, even potentially palladium, and some of these energy transition metals that are very strategic from a national perspective but also potentially lucrative.

I think the sale and refining of those co-products can help fund the expensive thermal energy that would be used to do that distillation. And so, if you connect these developments, you hydraulically balance them, maximize reuse and then implement water refining, I think that's the future for our industry to minimize disposal, while participating as a value add in the energy transition even potentially.

FR: Technology is such a key component of ESG, whether it's carbon capture or water management. How is Blackbuck using technology to achieve its ESG goals?

JL: I've said this to you in correspondence in the past, and I've said it in the public forum, I think our business, at its core, is an ESG business. We sequester waste from the oil and gas industry to help them produce energy. And we also enable recycling. Our program, as it relates to technology, is I would say it's complex, in that we're constantly working with new providers.

Just to give you an example, we talked about implementing those paddle turbines to convert kinetic energy into electricity. If you think about water refining and the amount of constituents that may be of value in the water, think about how many technology providers we may have to court in order to find not just a sequence of processes, but one single process that might work or be techno-economically feasible for say lithium extraction.

That's one everybody loves to talk about. It's a hot topic. But I think I've met with seven such providers in the last six months. And you have to work through all of that [and] understand those parameters. And then how does that interlace with another piece of technology?

We take a systematic approach. We're collecting data

all the time at all our sites. We leverage remote operations, and we're constantly trying to improve our ability to get a picture of what the water looks like. But at the end of the day, I mean, technology is great. And we've been talking about green technology and ESG and oil and gas since the onset of shale and before.

An old mentor of mine back, let's call it, in 2010. He used to go around [and] give presentations. And he'll know who he is, but he used to say, "It ain't green unless it's green." And so, we take a pragmatic approach in that we want to be the thought leaders. We want to drive this forward. We're willing to invest in non-green as in monetary green initiatives because we think we're better at differentiating in positions ourselves for the future and to attract investment. We think it's good for our current investors to return to be that thought leader.

But ultimately, you have to look at the economics. And because there's technology to distill water, we can make fresh water from produced water. And we can make all of it into fresh water, but then we have two Empire State Buildings of salt, I think every day in the Permian, if you back-of-a-napkin it.

And so there's the pragmatic application. In terms of processes and technology, we've leveraged third parties. Last year, we commissioned a third party to do our Scope 1 and Scope 2 emission study. We have this third party validate 2020, 2021 numbers. And now a path forward for collecting that data. We're also closing in on our Scope 3 now, which as many know, is a bit more of a challenge. It's a bit more of an art.

And so, we're leveraging other companies, we're leveraging systems that we've developed. We've hired PhDs to study the water. We've done all kinds of things. But technology is going to be what makes this thing on. It's just a matter of if it's economically green. 

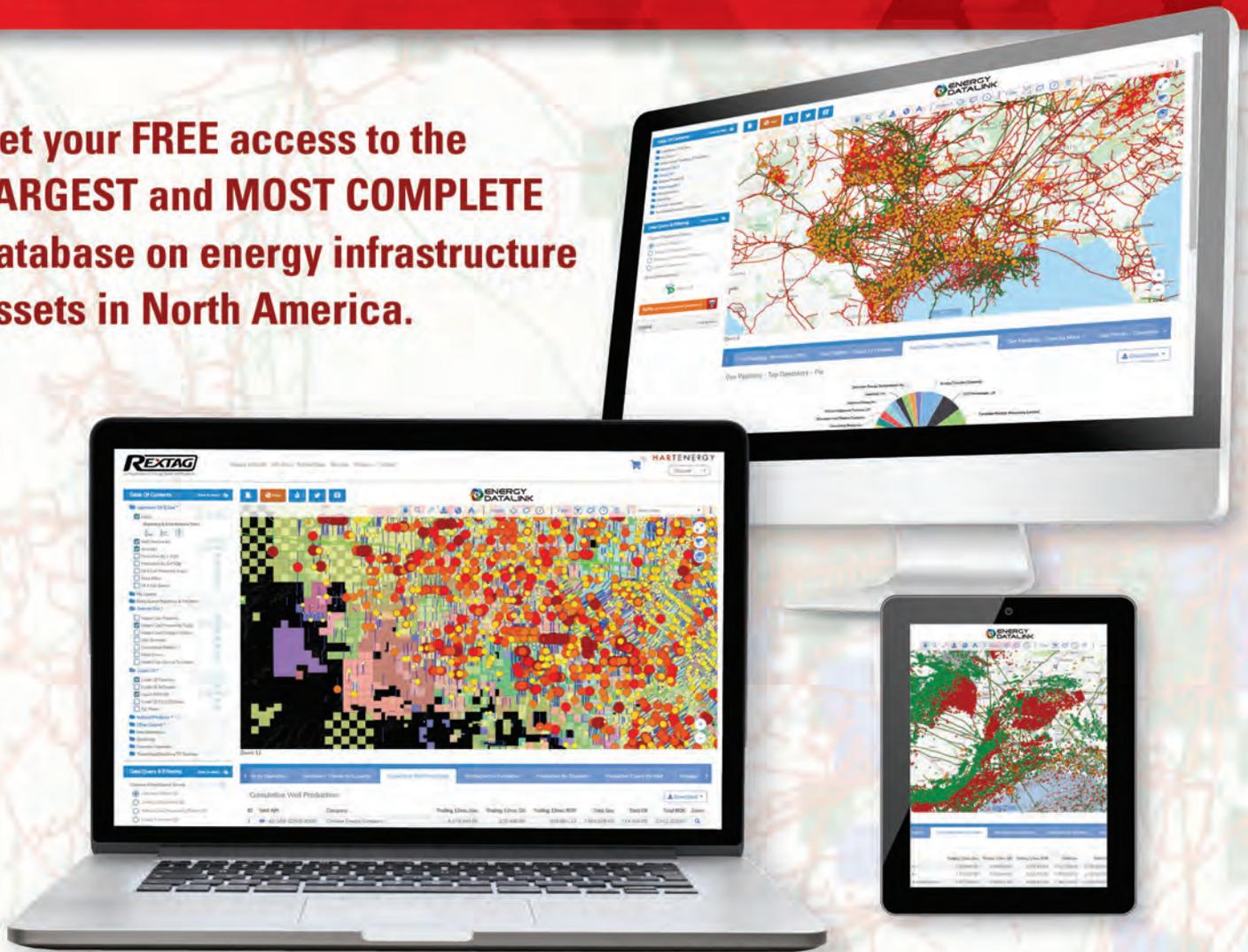
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The play's making more than 14 Bcf/d today, and the world is counting on this Gulf Coast LNG supplier to keep delivering—and more, too.

CHESAPEAKE ENERGY CORP.

ARTICLE BY



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In early April, the No. 2 U.S. rig count was the Haynesville's 77, second only to the mighty Permian Basin, according to Enverus' count.

In 2016, the count had dropped to as few as 24. The intersection of new-well productivity and iron count was met in 2015, as new-well results began to improve from about 4 MMcf/d to some 12 MMcf/d today, per the U.S. Energy Information Administration (EIA).

While productivity could be attributed to producers reining in their focus to the core as gas prices fell to average some \$2, overall Haynesville output grew, though, from 6 Bcf/d to now more than 14 Bcf/d.

Comstock Resources Inc. reported in February having brought online two 15,000-ft laterals with IPs between 41 MMcf/d and 48 MMcf/d.

“Adding dry-gas Haynesville to its wet-gas Marcellus provides ‘optionality that clearly differentiates Southwestern from its peers.’”

—Bill Way,
Southwestern Energy



“The play has exceeded my expectations.”

—Rob Turnham

Haynesville operators' combined 14 Bcf/d is enough alone to supply the 13 Bcf/d that U.S. LNG exporters are shipping—nearly all of it from the Gulf Coast. The Haynesville and Marcellus' combined 50 Bcf/d is as much as all U.S. gas production totaled 20 years ago.

“The play has exceeded my expectations,” said Rob Turnham, who was president and COO of one of the Haynesville's original producers, Goodrich Petroleum Corp., which was sold in December. “Completion methodology is recovering a higher percentage of the gas in place than originally thought.”

It was expected that more gas would be surfaced with more proppant and water per foot, along with tighter cluster and stage-interval spacing.



"But our original estimate [in 2008] was 2 Bcf per 1,000 ft of completed lateral versus the 2.5 Bcf we were achieving when we sold the company," he said.

Goodrich was bought by privately held EnCap Investments LP-backed Paloma Partners VI Holdings LLC for \$480 million in cash and debt assumption.

Also buying into the Haynesville is Marcellus-focused Southwestern Energy Co., which was the founder of the Fayetteville Shale play in 2004. It added the Haynesville last year, signing a deal in June for Indigo Natural Resources. It followed that by picking up GEP Haynesville LLC in November.

Southwestern president and CEO Bill Way told investors this February that, soon after its deals, gas fundamentals "strengthened materially, improving the economic value of the transactions.

"Our strategic entry into Haynesville was well-timed," he said. Adding dry-gas Haynesville to its wet-gas Marcellus provides "optionality that clearly differentiates Southwestern from its peers."

\$2.69 strip to \$5.59

What happened last year is that, exiting winter 2020 to 2021, which saw a large Asian draw on U.S. gas, U.S. futures didn't collapse, as they typically do. Instead, all futures rose, including shoulder months.

And the margin became less vast. January gas and September gas, for example, narrowed to a sub-20% price difference. Continuing into year-end 2021, price differences narrowed to within pennies.

Contributing to this was that the Wahalajara Pipeline from the Permian Basin's Waha hub to Guadalajara, Mexico, came online in the fall of 2020, bringing capacity to up to 7 Bcf/d of West Texas gas across the border and lightening some of the tamping on gas prices.

Meanwhile, demand for U.S. LNG that was approaching capacity of some 13 Bcf/d didn't decline.

The 12-month strip on Jan. 4, 2021, was \$2.69, according to Piper Sandler Research. In July of 2021, it was \$3.76.

This past April 1, in the midst of western European vows to discontinue sourcing gas from Russia, strip was \$5.59.

Getting Btu 'on the water'

In addition to Southwestern, Chesapeake Energy Corp. is also a Marcellus producer. Southwestern's Way said entering the Haynesville provides "direct access to LNG and global sales points and lowered [our] overall risk profile."

Chesapeake, the Haynesville's founder, had sold some of its leasehold over the years. In 2021, it bought

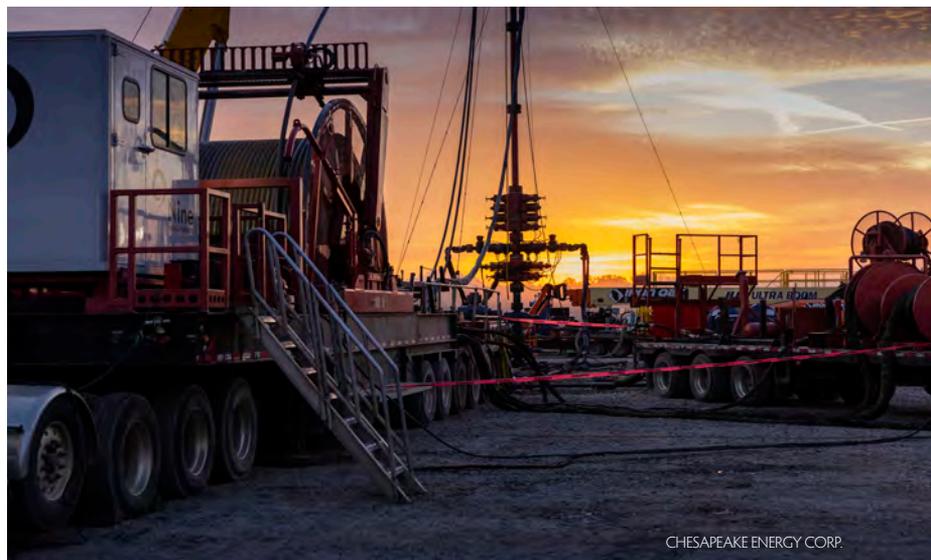


"We are pretty excited about the ability to take some of our molecules and get them on the water."

—Mohit Singh,
Chesapeake Energy Corp.

newly public Vine Energy Inc. In the Marcellus, it bolted on as well, picking up Chief E&D Holdings LP and Tug Hill Inc.'s nonop interests.

Mohit Singh, Chesapeake CFO, told investors in late February, in response to whether Chesapeake is working on internationally priced gas contracts, "We are pretty excited about the ability to take some of our molecules and get them on the water."



CHESAPEAKE ENERGY CORP.

Chesapeake is talking with potential counterparties but not near having anything to announce, he said. "So more to come on that."

In January, U.S. LNG exports totaled 354 Bcf with roughly 262 Bcf going to Europe and Turkey, per the EIA: 60 to the U.K.; 50, France; 49, Spain; 45, Turkey; 16, the Netherlands; 14, Belgium; and the balance to Croatia, Greece, Italy, Lithuania, Poland and Portugal.

A year earlier, U.S. exports were 305 Bcf, with 93 going to Europe and Turkey.

"Booming production from the Haynesville is expected to continue growing through the next decade, adding 50% to its current daily volumes," Wood Mackenzie analysts report.



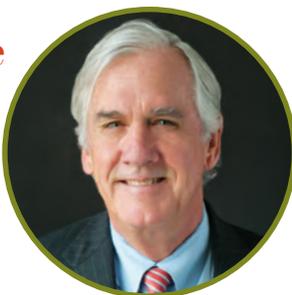
"Everybody is now scrambling for the ability to source gas in different places."

—Charif Souki,
Tellurian Inc.



“The Haynesville is incredibly advantaged.”

—Dick Stoneburner, *Petrohawk Energy Corp.*



Adding LNG capacity

Haynesville gas makes a mostly straight line to three existing Louisiana LNG export terminals—Sabine Pass, Hackberry and Calcasieu Pass.

Tellurian Inc. began construction in February of its long-delayed, 2-Bcf/d Driftwood export project north of Hackberry, proceeding with self-funding.

“What remains to be done is to finalize the financing,” Charif Souki, Tellurian executive chairman and co-founder, reported on March 29 in his vlog. It’s a \$12 billion project to be funded with two-thirds debt and one-third equity.

“We expect to finalize all of these conversations within the next 90 days.”

In a March 28 vlog, he spoke of the invasion of Ukraine: “It brings tears to your eyes.” In recent comments by leaders of European nations, “everybody is now scrambling for the ability to source gas in different places,” he said.

“And yet we are sitting here not quite making our mind up to allow American gas production to reach global shores in general and particularly in Europe today in a moment of crisis.”

The Biden administration has reported it is now fast-tracking new-facility and expansion permitting.

Souki said the U.S. now has “120 million [annual] tonnes that are permitted and

ready to go that need to be brought to the market as soon as possible.”

Driftwood is among those. “It’s one of these moments in life when things get put into perspective,” he said. “There are more important things that are happening today that are tragic and at the same time inspiring. Hopefully we at Tellurian can make a small contribution.”

Sempra Energy, operator of Cameron LNG at Hackberry, is working on adding another train, this one having capacity of 6.75 million tonnes per year. It is also developing Port Arthur LNG near Sabine Pass.

Three Louisiana projects by other developers could redirect Gulf of Mexico gas into LNG for export, reducing offshore gas’ competition with onshore gas.

The global gas call

Turnham said U.S. Gulf Coast LNG “could be called the largest green initiative in the world.” As more terminals are built, “the Haynesville will only grow more important.”

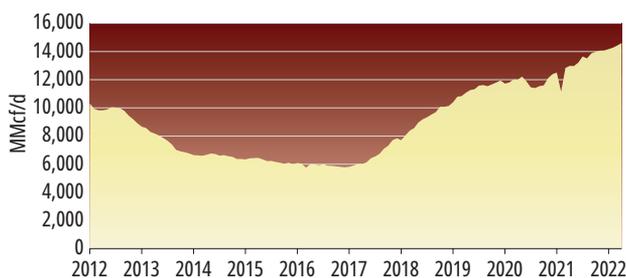
“As an industry, we should push for more gas production and LNG export capabilities while eliminating well emissions, providing the world with better options than relying on Russia and others, while taking market share from coal and becoming energy independent once again.”

Dick Stoneburner, who was president and COO of Haynesville co-leader Petrohawk Energy Corp., said that after all the cycles since the play’s discovery was announced in early 2008, “history is smiling down on the Haynesville right now.”

Marcellus growth is constrained by the inability to get more big pipe into the ground. “Those problems simply do not exist in the Haynesville and the associated Gulf Coast infrastructure.”

So that leaves the Haynesville to answer the global gas call. “The Haynesville is

Haynesville Region Natural Gas Production



Source: U.S. Energy Information Administration

incredibly advantaged,” Stoneburner said, “with a resource that can deliver significant volumes very quickly and get them to market without the constraints of the Marcellus, which is the only other major shale gas basin in the Lower 48 that can truly help with supplying the world with natural gas.”

More gas, less cost

Southwestern’s Way said more than 75% of U.S. gas demand growth is expected to happen along the Gulf Coast, and that’s where 65% of Southwestern’s gas is sold.

The operator expects to average 8.5 rigs and 3.5 completion crews in its Haynesville property this year for up to 75 wells and 55% of total D&C spend. Its Marcellus spend is expected to D&C up to 65 wells.

Its fourth-quarter 2021 Haynesville wells had laterals averaging 6,900 ft for \$1,600 a foot. IPs were more than 26 MMcf/d “and continue to strengthen,” Clay Carrell, Southwestern COO, said.

Comstock’s chairman and CEO Jay Allison told investors in mid-February that “our drilling inventory has never been more valuable or stronger.”

Haynesville pure-play Comstock reported that, as oilfield costs have risen, its push to longer laterals has resulted in less expensive D&C per foot. D&C in the fourth quarter was \$1,027 per foot (\$413/ft to drill; \$615/ft to complete), which was 2% less than in the third quarter “and flat compared to our full-year 2020 D&C costs,” Dan Harrison, Comstock COO, said.

The operators’ first two 15,000-ft Haynesville laterals, the Talley #1 and #2, came on with 41 MMcf/d and 48 MMcf/d.

Last year, it added 49,000 net acres for \$57.7 million or \$1,178 per acre, Allison said. Among its deals, it added some 17,000 net adjacent acres in East Texas for \$35 million that means 44 laterals Comstock already planned on its own property can be extended.

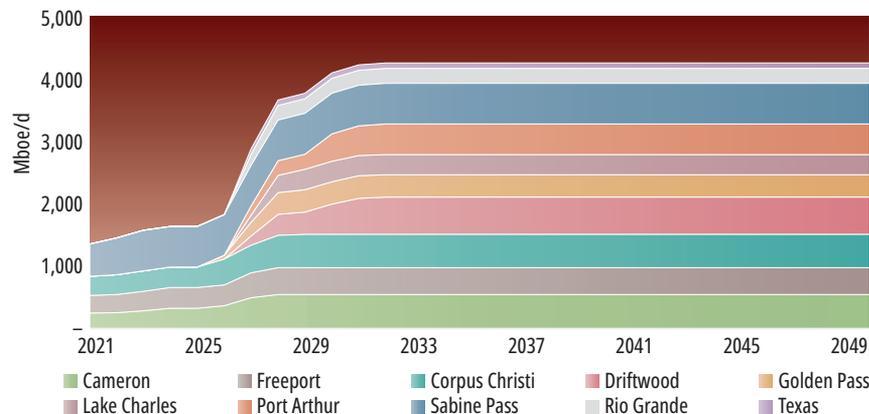
More M&A

Drilling inventory “is the holy grail of E&P companies,” Allison said. “I think that’s why you have a lot of M&A in the last year or two years.”

In addition to Chesapeake buying Vine, Southwestern buying Indigo and GEP, and Paloma buying Goodrich, Diversified Energy Co. Plc entered with a Cotton Valley package for \$117 million and followed with buying operator Tanos Energy Holdings III LLC for \$116 million.

At press time, Aethon Energy was reportedly selling its Louisiana Haynesville assets. Nitin Kumar, analyst for Wells Fargo Securities LLC, described Aethon in January as “one of the fastest-growing gas operators in

Significant Forecasted Demand From Gulf Coast LNG



Source: Diversified Energy, WoodMac, Bloomberg

the U.S. onshore.” It holds more than 320,000 net acres, with some 170,000 of these in Louisiana.

Prior to 2021, Japan’s Osaka Gas took 100% ownership of Sabine Oil & Gas Corp. It also owns 8.3% of Freeport LNG’s export capacity.

Japan’s Tokyo Gas increased its holding to 70% in Castleton Commodities International LLC’s Haynesville operator, now known as TG Natural Resources, which holds some 304,000 net acres.

Other formations

Is there any way to grow a Haynesville footprint other than buying into it?

Stoneburner said, “I do believe there is a reasonable chance that the play could expand if a company is willing to take some geologic risk.”

While at Petrohawk, “we worked hard at trying to convince ourselves that there was an eastern extension, but it gets very deep very quickly, and what little subsurface control that existed was not all that supportive.”

Going north, the facies lack enough organic shale. “I think the one area that has yet to be tested adequately is to the south. I don’t suspect that it would open up a lot of acreage, but I do recall that there were subsurface data points that made an extension in that direction pretty interesting.”

How about the Cotton Valley and Hosston, overlying the Haynesville? “I think the shallower formations are, for the most part, fully exploited,” Stoneburner said.



“Our drilling inventory has never been more valuable or stronger.”

—Jay Allison,
Comstock Resources Inc.

Turnham added, “The productivity and economics in those shallower zones don’t compete with the Haynesville if the acreage is in the core of the play.”

Otherwise, the means of leasehold growth that is remaining is by pocketbook, Turnham said. “There is likely more room for smaller farm-ins, joint ventures and transactions in East Texas versus in North Louisiana, where traditional M&A will continue due to a small number of companies controlling the core of the acreage.”

IS OFFSHORE OIL AND GAS DRILLING MAKING A COMEBACK?



Analysts point to data indicating improvement for offshore drilling, particularly floating rigs, with room to grow.

ARTICLE BY



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Buried among talk of an energy transition, oil market volatility, U.S. shale supply chain concerns and inflation woes, a new theme appears to be emerging.

Analysts say offshore oil and gas drilling activity is reawakening.

"Quite frankly, offshore has been dead for a decade, [but] offshore is coming back," said James West, senior managing director and partner at Evercore ISI. "We've seen deepwater day rates go from \$150,000 at the bottom per day to almost \$400,000 in recent months in the Gulf of Mexico."

The future appears positive for offshore drillers as the world's needs for energy rises and doors open opportunities to capture value during the energy transition. Like other sectors, offshore drillers continue to recover from challenges brought in part by

COVID-19, but optimism abounds with high oil prices and customer demand growing alongside utilization for high-specification rigs, specifically floaters.

"Over the next five to 10 years we see a healthy offshore rig market," West said, "but limited new frontiers opening up as the fear of stranded assets grows."

For now, high utilization—which in March 2022 was 100% for deepwater rigs in the U.S. Gulf of Mexico (GoM)—and impressive day rates, which include drilling powerhouse Transocean Ltd. landing in the first quarter a \$395,000 per day, two-well contract in the GoM for its *Deepwater Asgard* drillship, have

given hope. The contract was up \$100,000 per day from its previous contract.

Day rates could go even higher as the market tightens, according to Liz Tysall, senior offshore rig analyst for Rystad Energy.

"We definitely expect to see some rig contracts make it into the \$400,000 per day range and potentially higher outside of the harsh environment market," Tysall said.

The outlook comes as oil and gas operators step up drilling activity in several regions. Transocean has said it expects overall rig demand to see annual growth of 9% from 21 years in 2021 to 31 years on contract in 2026 in Brazil.

Add to this strong activity for floaters in the Suriname-Guyana Basin, where the Exxon Mobil Corp.-led consortium has been keeping drillships busy, having discovered more than an estimated 10 Bboe of recoverable resources—enough for up to 10 development projects. Utilization is also growing offshore Namibia and South Africa, where TotalEnergies has proven the potential of plays in the Orange Basin.

"The offshore drilling sector is moving back toward, and in some areas surpassing, the pre-pandemic levels witnessed at the end of 2019," Tysall said.

Besides improvement in day rates and rig demand, contracting activity has also picked up.

"Certain benefits are shifting back toward the drilling contractors such as E&Ps paying for mobilization fees and some rig upgrades," she said. "Improvements are being driven by increased consumer demand now that pandemic restrictions are easing, a rise in the oil price and energy security concerns."



“Over the next five to 10 years we see a healthy offshore rig market.”

—James West,
Evercore ISI

A pickup in exploration activity in frontier plays and international E&P spending, as West pointed out in a March webcast, is also contributing to the offshore comeback.

"With reserve replacement ratios at all-time lows for the IOCs [international oil companies] and even the NOCs [national oil companies], we're beginning to search for these new reserves," West said. "This disproportionately is positive for a company like Schlumberger, which dominates in the offshore and has a big exploration-focused business, but also for the offshore drillers Transocean, Noble and Valaris."

While opportunities to put rigs to work are up, the supply of rigs ready to clock in is tight with attrition at play even as utilization rises.

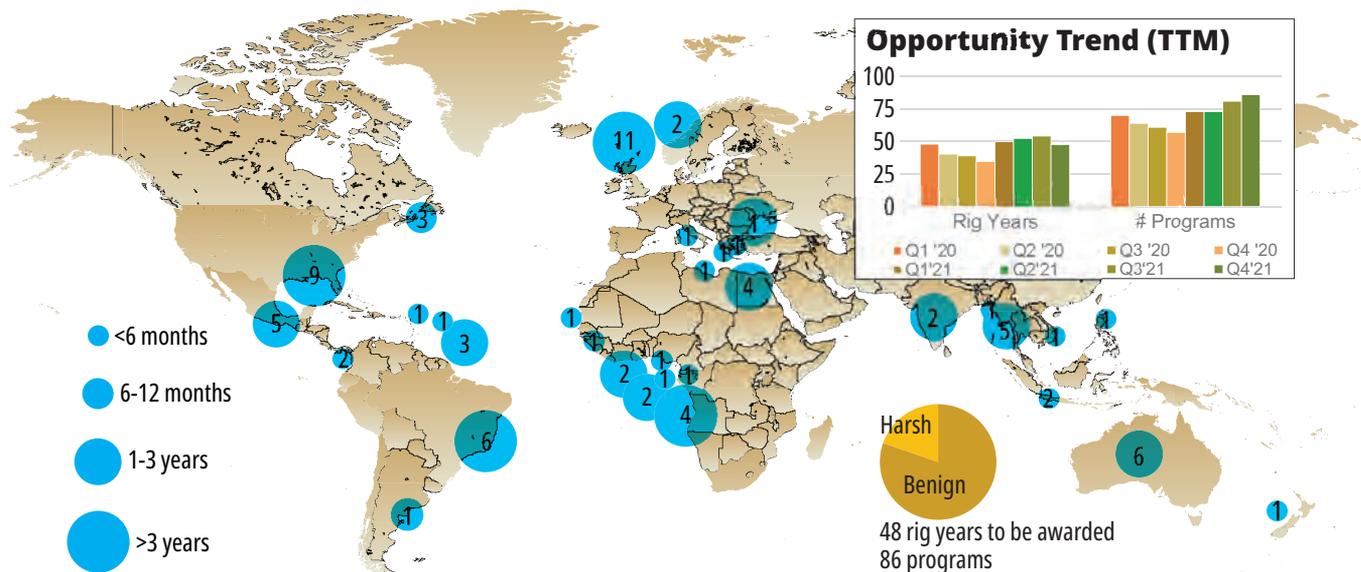
"I think the market is about to be surprised by the lack of rig availability and the day rates being commanded by the asset owners," West said.

Driving activity

Fleet utilization has nearly rebounded to levels seen in March 2020 as demand steadily improves but not yet back to levels of early 2020, according to Terry Childs, head of Westwood Global Energy Group's RigLogix. Speaking during a Bloomberg Intelligence webinar in mid-March 2022, Childs said marketed utilization hit 85%, up from the 79% at year-end 2020. The figure, which excludes cold-stacked units, is just below the 87% reported in March 2020.

The improvement comes thanks in part, he said, to attrition as well as higher demand. Utilization is "not as bad as it certainly could be," Childs said. "We could [be] in for a decent year."

Floater Opportunities - Start Date Next 18 Months



Source: IHS Markit; Transocean Ltd.

“The offshore drilling sector is moving back toward, and in some areas surpassing, the pre-pandemic levels witnessed at the end of 2019.”



—Liz Tysall,
Rystad Energy

Since September 2014, RigLogix data show, nearly 325 rigs have been retired, more jackups and semisubmersibles than drillships, while just over 160 rigs have been delivered. Potential contracts this year could lead to more deliveries, which remain “lackluster” at the moment, Childs said.

“When you get into an upturn in the market, which we’re certainly in now for the most part, attrition slows down, so certainly something to watch for there as well,” Childs said.

Of the main rig types, drillships appear to be on a “strong run.” By February, global marketed floating rig utilization had risen to 84%, up from 81% a year earlier, dominated by activity in the so-called Golden Triangle, which comprises the GoM, South America and Africa.

Data show marketed utilization for floaters at 88% offshore Africa, where contracted drillships include the *Maersk Voyager* offshore Namibia; 96% in South America, with activity offshore Guyana, Suriname and Brazil; and at 96% in the U.S. GoM, where drillships in use include the *Diamond Ocean BlackLion* at the BP-operated Mad Dog Phase 2 development.

“Ultradeepwater rig demand is virtually sold out in the U.S. Gulf of Mexico, and the remainder of the Golden Triangle looks very tight this year and into early 2023,” Tysall added. “Oil companies have gotten used to all the ‘bells and whistles’ on a high-specification drillship, and E&Ps are requiring that rigs be outfitted with certain types of

equipment, such as MPD [managed pressure drilling], in their tender documents.”

Only 17 floaters were retired in 2021, the second fewest since 2014.

“I think there’s certainly still some attrition candidates,” Childs said, however, activity is slowing down attrition.

Tysall agreed, pointing out about 45% of idle floaters are cold stacked.

“Attrition has definitely served to move the floater market toward a more balanced state,” she said.

Looking at the floating rig contract backlog for drillships and semisubs, Childs again pointed out how activity in the Golden Triangle is ahead of other parts of the world. The backlog for new fixtures between 2019 and 2021 jumped to 43 in South America, up from 23, led by Petrobras; 23, up from eight, in the GoM; and to 14, up from eight, in Africa.

“While the GoM moved the fastest, the rest of the Golden Triangle is playing catch up. Petronas has fully contracted local deepwater assets in Brazil and is now tendering for additional equipment, while the majors who have entered Brazil are also negotiating for incremental rigs to join the market,” West said. “West Africa is the laggard, but most of the majors are now seeking rig supply for additional work, and I expect that market to tighten as well.”

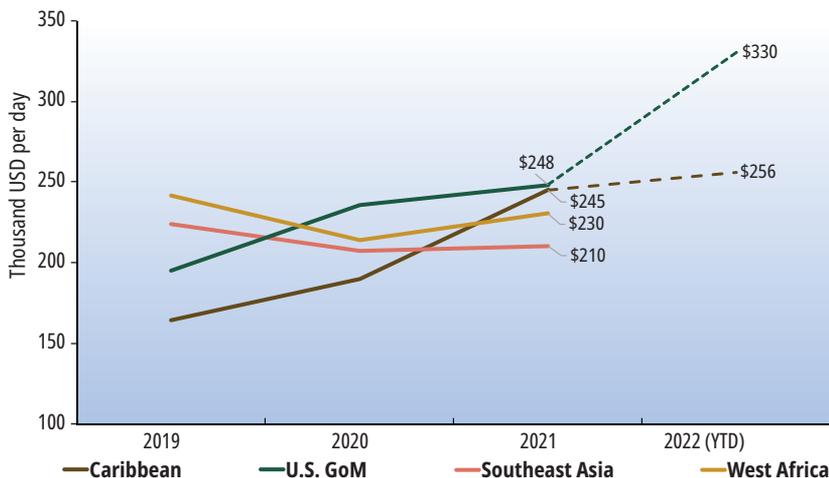
Newbuilds are in the making, but it’ll take some time before they become available.

“There are about 20 floater newbuilds still in the shipyards, but these are unfinished and do not have spare parts,” West said. “To mobilize for work is likely a \$50 million to \$100 million capital cost, and day rates above \$400,000 are needed for this level of investment.”

Of the 20 or so floaters to be delivered, Tysall said realistically only about half of those rigs will be delivered. “And deliveries will only happen if there is a term contract with strong day rates.”

The U.S. Gulf of Mexico sees largest improvement in day rates.

Annual Average Day Rate By Region For High-Spec UDW Rigs



Source: Rystad Energy RigCube

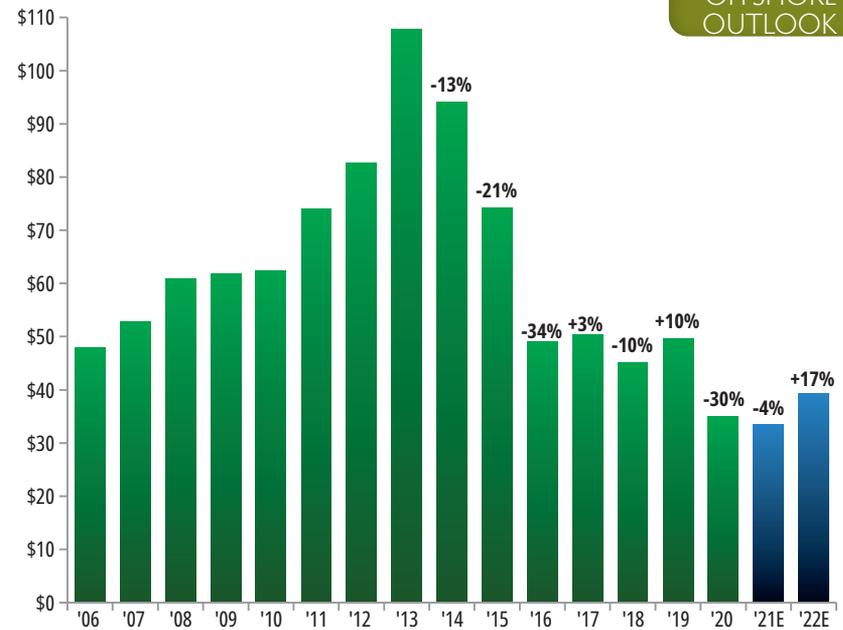
Looking forward

What could the rest of 2022 and next year hold for the sector?

“We expect five to seven newbuild floating rigs to be delivered, but we think also 15 to 20 could be removed from the fleet,” Childs said. “So, we still should see a net decline in supply. Obviously, we believe demand is going to increase quite substantially in the floating rig fleet. You couple that with the supply decline, we should see utilization increase. It may depend on that attrition level and the level of how much demand goes up, but we should still see a pretty decent number there.”

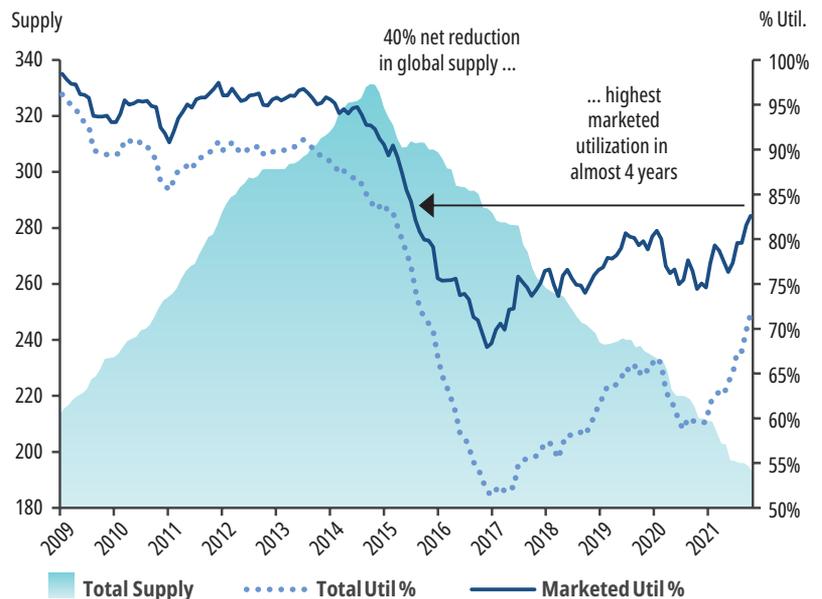
More M&A activity could also be in store for offshore drillers, the analysts said.

Majors International E&P Capital Spending (US\$B)



Source: Evercore ISI

Floating Rig Market Is The Strongest It's Been In Years



Source: Evercore ISI

Denmark's Maersk Drilling announced in November its plans to merge with U.S.-based Noble Corp. in a \$3.4 billion deal, relocating to Houston and operating as Noble. That news came after Noble acquired Pacific Drilling in April 2021.

"That activity, as many of you know, is certainly not over," Childs said of M&A. "There's rumors of potential combinations, sales, etc."

It's not a question of "if" but "who and when" M&A deals will happen, he added.

With utilization at 100% in the U.S. GoM, analysts expect little availability for the rest of 2022 and into 2023. "There are some shorter jobs and whatnot but not a lot of movement just because there's nothing to sign at the moment."

Elsewhere, operators are expected to pick up activity next year such as offshore Norway, where the semisubmersible market has been described as "a bit depressed" lately. Only three requirements are in the rig inquiry stage, Childs said.

In southeast Asia, he said there are five active tenders with 2022 start dates, but recent retirements of semisubmersibles are cause for concern. He does, however, expect to see some improvement in rates, which could approach the \$200,000 per day mark.

Globally, analysts forecast utilization rising to 88% in 2022, up from more than 70% last year. Childs called it a "bold prediction" and doesn't think it will be far off the mark. That's assuming no major market or regulatory curveballs. "I think the floating market looks pretty good for this year and probably into early '23 as well."

Not limited by oil and gas, offshore drillers are also diving into the energy transition space.

"The rig operators will continue to improve drilling performance through new technology and also decarbonize their operations," West said. "They will also increasingly look at geothermal and CCUS [carbon capture, utilization and storage] as avenues of growth as well as offshore wind power."

Nabors Industries Ltd. is adding more ultradeep drilling technology to its portfolio with its \$8 billion investment in GA Drilling, a geothermal technology company that specializes in plasma drilling.

Transocean also moved further into the renewables energy market with its purchase of a minority interest in Ocean Minerals Ltd., a provider of cobalt and rare earth minerals sourced from the seabed. The company is also using its *Transocean Enabler* semi-submersible to drill a well and sidetrack for the Northern Lights Carbon Transport and Storage project, led by Equinor, Shell Plc and TotalEnergies, on the Norwegian Continental Shelf.

With carbon capture and storage project scopes varying across regions and the market evolving, Tysall said Rystad sees

demand in this area primarily for rigs that can drill in shallow water areas.

"Reducing carbon is on the agenda for most E&Ps, and there is an ever-stronger call for oil companies to take a leadership role when it comes to reducing their carbon footprint," she said. "Drilling contractors are also adopting emission reduction technologies and have begun upgrading rigs with technologies such as NOx SCR Systems, as well as software systems to help manage diesel consumption. Some E&Ps are also adopting contract terms that incentivize and reward such initiatives on the part of the drilling contractor."

There will still be a need for oil and gas offshore drilling, however, to meet demand in the short to medium term.

"The offshore drilling market can be expected to continue on an improvement trajectory over the next four to five years," she said. "Offshore production is a competitive resource that will remain relevant." 



The Ukraine war has the potential to redraw the world's energy map, particularly as U.S. LNG begins to flow to Europe to replace Russian natural gas.

ARTICLE BY



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ILLUSTRATION BY
ROBERT D. AVILA

Uncertain times call for cold-blooded thinking. At a Rice University's Baker Institute discussion on oil prices and the Russian war in Ukraine, moderator Mark Finley recalled a terrorist attack in one of the countries he covered early in his career as an analyst and manager at the CIA.

Finley said he found an upset analyst at a desk asking, "How can I do my job? How can you ask me not to care?"

Finley responded that it was normal to care, but the way to do the job in a stressful situation is to focus on the facts "and the cold-blooded analysis."

As events unfold, including reports of possible war crimes, they mirror the unpredictability seen during the early days of the pandemic that gripped the world for the past two years. Minor events and untrustworthy pronouncements, such as the Kremlin's suggestion that its army would pull back from Ukraine's capital, Kyiv, have driven oil prices flailing.

Like kerosene thrown into a campfire, war has inflamed an already antsy world. Inflation and supply chain bottlenecks along with lingering outbreaks of COVID have seared one clear theme into first-quarter 2022: uncertainty.

No one is sure how long Russia will wage war or how much of its oil will stay off the market and for how

long. Or whether the massive disruption of energy supplies to the EU will hasten the energy transition. And fears persist that surging oil prices may rise so high that demand destruction begins to erode the economy.

But the unintended consequences of Russia's invasion of Ukraine could permanently redraw the world's energy map, particularly as U.S. LNG begins to flow to Europe to replace Russian natural gas. The more prolonged the conflict, the more indelible those new lines become.

"The end result of the crisis in Ukraine could affect the world order for decades to come," said Andrew Fletcher, senior vice president for commodity derivatives at KeyBank National Association. "Whatever the outcome, it will have significant and immediate implications for European energy policy, positively affecting the LNG industry here in the U.S."

Sanctions on Russian crude oil, including bans by the U.S., Canada

and several other countries, have been augmented by energy companies that are "self-sanctioning" by refusing to purchase heavily discounted Russian cargos.

Shikha Chaturvedi, head of global natural gas strategy at J.P. Morgan, said Russian oil exports will decrease by about 2 MMbbl/d in April. At the event where Finley was moderated, Chaturvedi said that some of those exports will be lost "in perpetuity."

"We think that there is a loss of Russian supply by probably about a million barrels a day ... where consumers can find other sources for their oil imports," Chaturvedi said.

OPEC, with spare capacity, could have come to the rescue, but on March 31, the cartel decided to stay the course on a gradual increase in production, providing an additional 432,000 bbl/d by May 1. Analysts had seen a dramatic increase unlikely since Russia has spent years fostering relationships with OPEC+ members and have brushed off some attempts at U.S. communication, opting instead to consult with Russian President Vladimir Putin.

"That makes the group more reluctant, I would say, to bring spare capacity into play because Russia has been deepening its energy ties with all of those key Middle East and OPEC+ members," Emma Richards, senior oil and gas analyst for Fitch Solutions, said during a March webinar prior to OPEC's March 31 meeting.

OPEC's strategy regarding the markets isn't solely economic, but also political.

"Oil is a lever, but that's always been the case. It's a geopolitical lever," said Kenneth B. Medlock III, senior director of the Center for Energy Studies at the James A. Baker III Institute for Public Policy.

With no additional supply coming, President Joseph Biden has ordered the release of 180 MMbbl of oil from the Strategic Petroleum Reserve.

And while he simultaneously hailed the rise in U.S. oil production, he also criticized the industry for not doing more. He said Congress should require companies to pay fees on federal leases that they haven't used. Biden began his term by ordering the Secretary of the Interior to pause new oil and natural gas leases on public lands or offshore waters "to the extent possible."

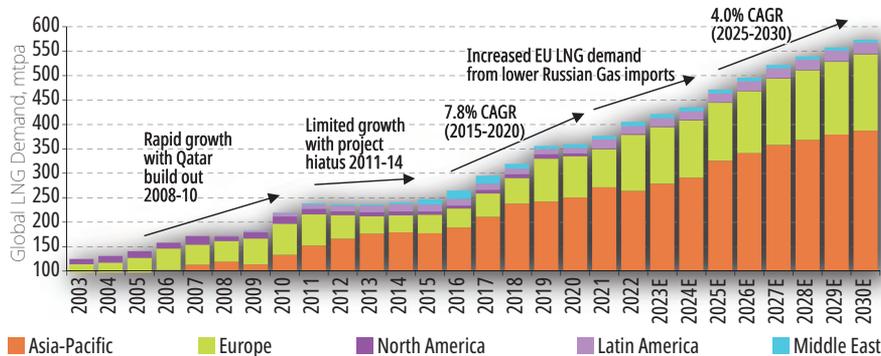
But it is likely U.S. E&Ps that have the largest impact on picking up the slack going forward, particularly when it comes to weaning Europe off European gas.

In the field

With the world's oil supply as taut as a screeching violin string, the International Energy Agency (IEA) dusted off its plan for reducing demand. The agency's top strategy hasn't changed in 16 years: carpooling.

The simplicity of ridesharing to alleviate

Global LNG Demand



Source: Bloomberg, Bernstein estimates and analysis

tight oil supplies belies the bedlam at work in the oil and gas markets. Even before Russian forces invaded Ukraine, the world's oil and natural gas supplies were unusually tight as the economies began to rebound from the pandemic.

In the Dallas Fed's quarterly survey released March 23, oilfield service companies laid out what has become a common refrain: elevated geopolitical risk, persistent supply-chain issues, continued labor shortages, shrinking capital availability and rising inflation.

Ryan Keys, CEO of Permian Basin driller Triple Crown Resources LLC, said the one thing he can predict is more volatility and the risk of a "severe recession" should energy prices get too high for too long.

"It's almost too volatile to estimate right now, but we're seeing well costs across the industry 20% to 30% higher now than this time last year," Keys said, adding that things change daily. "There are shortages everywhere, which makes it difficult to plan. And with the industry spread so thin, efficiency and performance suffer some. No one is immune."

U.S. diesel costs have risen by 44% since January, to about \$5.19 per gallon in late March, hurting the energy industry, which is one of the biggest customers of its own products.

"It takes a lot of energy to drill and complete a new well," he said. "Diesel and natural gas prices are almost twice what they were last year, and we use a lot of both to drill and complete a new well."

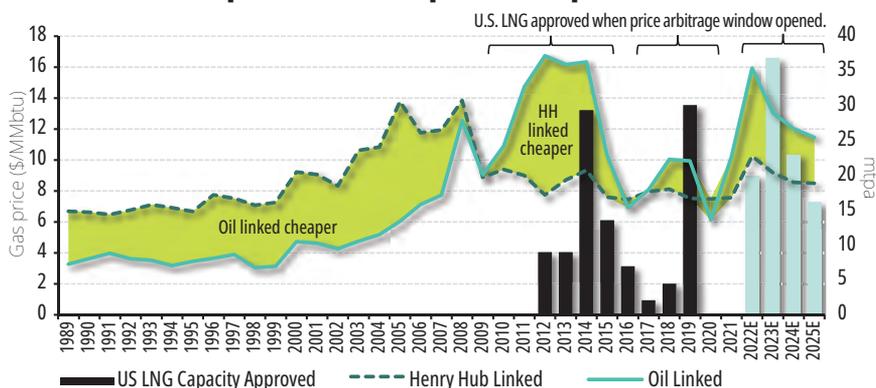
In comments to the Dallas Fed, oilfield service companies said COVID has starved them of finding seasoned employees, adding to delays and expenses.

"The biggest constraint remains finding qualified employees to hire," one respondent said.

Another: "Commodity prices are a guess with the current turmoil in the markets across the globe."

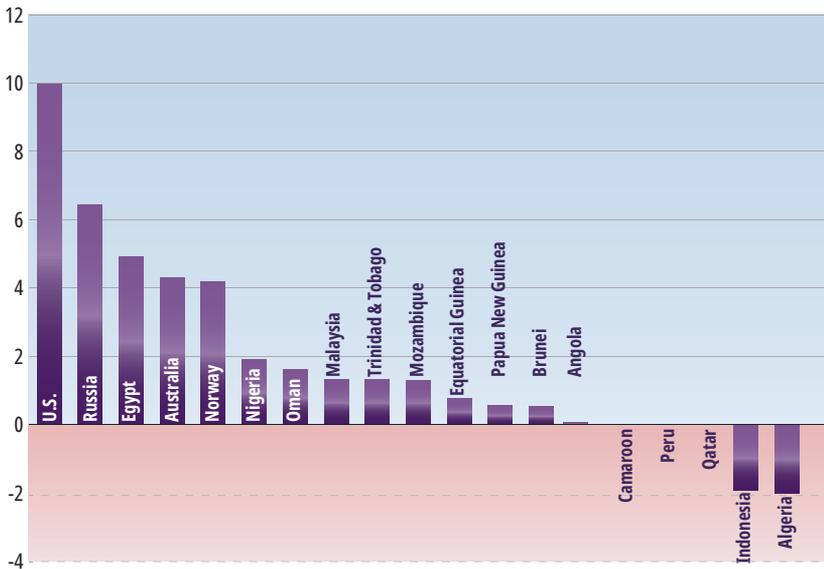
Global LNG demand is set to grow by 4.8% CAGR out to 2030 driven by increased European imports to displace Russian gas and pro-gas policies in Asia, Bernstein says.

US LNG Prices Open Door To Expanded Exports



Source: Bloomberg, company data, Bernstein estimates and analysis

Selected Markets - LNG Export Growth (2022e) (bcm)



Source: Fitch Solutions

The U.S. is expected to lead in global LNG exports and capacity growth.

“Our onshore U.S. exploration and production customers continue with their cautious and disciplined approach. There is no exploration spending,” another respondent said. And on what happens next, one person told the Fed Survey, “So much uncertainty makes it, for me at least, virtually impossible to predict anything beyond this afternoon. There is uncertainty domestically, globally and regulatory.”

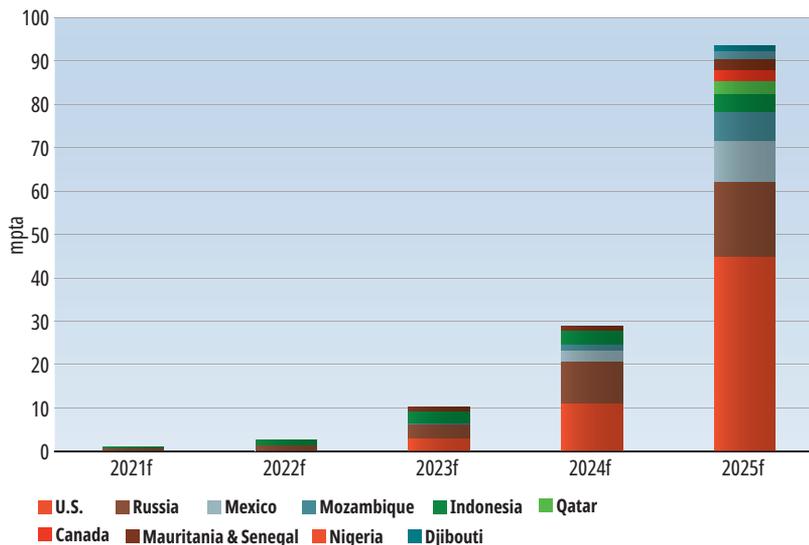
The crude reality

The first quarter of 2022 has been marred by unrelenting confusion, backwardation and wide variance among analysts’ oil price predictions. Fitch Solutions said demand is overestimated and that prices this year will average \$82/bbl. On March 7, Goldman Sachs raised its 2022 Brent spot price up by 38% to \$135/bbl from an initial forecast of \$98/bbl.

The U.S. leads in planned and proposed projects.

In a doomsday scenario in which Europe bans Russian oil, J.P. Morgan said Brent spot prices could careen out to \$185/bbl. Reported atrocities in Kyiv suburbs have pushed Europe to the brink of such sanctions and driven a promised reduction of Russian coal imports.

Global Under Construction, Pre-FID And Proposed LNG Export Terminals By Location



Source: Fitch Solutions

A nervous market can be seen in daily Brent spot prices, which in an 18-day span beginning Feb. 24 prices yo-yoed from as low as \$98 to as high as \$133, according to Energy Information Administration (EIA) data.

Despite a restrained and disciplined E&P sector, companies are on track to see oil production growth in 2022 led by the Permian Basin.

After U.S. crude oil production fell below 11.6 MMbbl/d in December, the EIA forecast that production will rise to average 12 MMbbl/d in 2022 and then to record-high production on an annual average basis of 13 MMbbl/d in 2023. The previous annual-average record of 12.3 MMbbl/d was set in 2019.

Kristine Petrosyan, an oil analyst at the IEA, said that the closest thing the U.S. has to spare capacity are DUCs that were built up and then completed during COVID.

“We are sitting currently on the floor of availability of these wells that can be brought online very quickly and contribute to increased production,” Petrosyan said.

With E&Ps hampered by limited labor shortages and supply chain problems, the time to get oil to market from new wells has also increased.

In the past, companies could bring wells online within three to six months. Now Petrosyan sees about two months of active work required to bring a well online, “but in general, it takes up to eight months with all the waits [and] the time required to sit between subsequent stages of perforations in the well. So really we’re talking about an eight month lead for a well to come online.”

Shale drillers could increase production by 500,000 bbl/d by the end of 2022, but she said that production will cost about 30%

“The end result of the crisis in Ukraine could affect the world order for decades to come. Whatever the outcome, it will have significant and immediate implications for European energy policy, positively affecting the LNG industry here in the U.S.”

—Andrew Fletcher,
KeyBank National Association

**“The world is arguably
‘on the precipice of
dipping into another sort
of recessionary period,’
though not to the depth
that COVID caused.”**

—**Kenneth B. Medlock III,**
*James A. Baker III
Institute for Public Policy*

more, in line with what Keys said he already sees happening.

Paradigm shift

Bernstein analyst Neil Beveridge said a new LNG paradigm is coming as Europe pledged to reduce its Russian gas imports by two-thirds.

“The Russian invasion of Ukraine is a game changer for LNG. In the near term, increased European LNG demand will result in higher prices and demand destruction in Asia to balance the market through higher prices. This is good for upstream LNG suppliers and bad for downstream gas utilities in Europe and Asia.”

U.S. LNG players are arguably the biggest beneficiary, Beveridge wrote in a March 28 report.

“The U.S. can add liquefaction trains quicker than any other country, has proximity to European LNG markets and ticks all the right boxes geopolitically,” he said. “Qatar also has the resources to expand, but with six trains being built, there are limits. Australasia is possible but has longer time scales.”

The war in Ukraine represents a “paradigm shift” for LNG.

“In the short term, global LNG demand will be unaffected however, given that there is no spare capacity,” Beveridge said. “Over the next 12 months Europe plans to replace 100 Bcm of Russian pipeline gas with LNG, energy efficiency and renewable energy,” he said. “This will add a minimum of 35 mtpa [million tonnes per annum] of LNG demand. Longer term, we think that Europe will need to replace 100 Bcm of LNG to the EU market this year, with expected increases going forward.”

Despite U.S. exports of natural gas, higher domestic prices are disconnected from global gas prices and are unrelated to the Ukraine war, said Samantha Dart, an analyst at Goldman Sachs.

U.S. prices are “mainly driven by weather, production and low liquidity,” Dart said.

While oil prices are not at a historic high, natural gas prices are at record highs, which is why energy prices as a percent of GDP are at alarming levels.

Demand destruction

Like all estimates, those posed by analysts include assumptions that are subject to change.

But measurable effects of the war, COVID and related factors have started to show up.

The cost of oil, coal and natural gas as a percentage of GDP reached 8% in March, the highest since the global financial crisis in 2008, Beveridge said in a March 7 report.

“Demand destruction tends to occur when oil costs as a percentage of GDP rise to greater than 4% over a sustainable period,” he said. “There is no single magic number for demand destruction, but oil as a percentage of global GDP has surged to 4.5% of GDP in March, which historically has triggered demand destruction in subsequent periods, and there is a possibility that history could repeat. Past events suggest that there are high risks of oil demand destruction when oil reaches greater than 4% of global GDP for a sustainable period.”

Medlock said the world is arguably “on the precipice of dipping into another sort of recessionary period,” though not to the depth that COVID caused.

Medlock said that it's still early days and that while price shocks have been tough, the sky isn't falling.

Demand destruction could kick in when prices are high enough to discourage use of oil and gas, causing an economy-wide reduction in investment activity.

When energy costs are unpredictable, investments tend to slow down as people try to understand what comes next.

“As a result, that tends to put a drag on overall economic activity from the consumer perspective; higher prices mean you've got less disposable income, which means you don't go out to as many movies or out to dinner as often,” he said. “That reduction in disposable income means you're spending less as well as a consumer, which tends to trigger a reduction in overall GDP.”

Keys said demand destruction has already started.

“There are indicators that people's behaviors have already changed,” he said. “But right now, it's probably not impactful enough to affect the crude shortages we're projecting this year.”

“Energy prices affect everything, and every other part of the economy is a derivative, to some extent, of energy prices,” he said. “So we'll get indirect demand destruction by all this inflation we're seeing elsewhere in the economy. Demand is the only knob we can turn right now. The supply knob is stuck where it is.” 



GETTING THE DEAL DONE



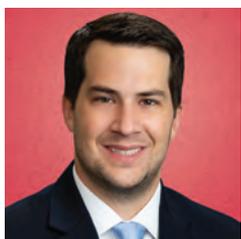
Here are key factors when considering representation and warranty insurance in A&D transactions.

ARTICLE BY



JONATHAN WHALEN

AND



JAMES ROBERTSON

As representation and warranty insurance (RWI) became commonplace in the M&A landscape, its use in upstream A&D transactions generally lagged, with RWI initially being used by buyers to alleviate collection concerns in transactions with distressed sellers.

However, as A&D activity rebounded following the worst of the pandemic, dealmakers have increasingly implemented RWI. Regardless of whether this trend is attributable to the influence of private equity in the oil and gas industry, the evolution of the RWI market and/or increased demand for the benefits of RWI during the recent wave of consolidations, dealmakers will increasingly be required to consider whether RWI makes sense for a particular transaction.

Keeping in mind this trend, this article focuses upon the benefits of RWI for sellers and buyers, as well as other practical considerations that can impact the analysis of whether using RWI makes sense for a particular transaction.

Benefits of RWI for sellers

By shifting the risk of certain losses from the seller under the purchase agreement to an insurer or policy, sellers (and their investors and shareholders) increase

the certainty of proceeds from the transaction by limiting the seller's post-closing exposure for contingent liabilities. Additionally, the amount of proceeds received by the seller at closing can be maximized in transactions in which RWI is used by significantly reducing or eliminating the need for a post-closing indemnity/holdback escrow.

By replacing or reducing the need for an indemnity/holdback escrow (as the buyer would instead look to a credit worthy insurer), a larger portion of the sales proceeds can be paid to the seller at closing. For certain types of sellers, such as private equity funds, individual sellers, post-bankruptcy sellers (with equitized shareholders) or seller groups, the ability to cleanly exit the asset or business and immediately distribute sale proceeds at closing can be of the utmost importance, and when RWI is utilized, the seller may be able to distribute substantially all of the sale proceeds following closing without risk that those distributions would

be subject to clawback based on contingent liabilities arising from potential rep breaches. Similarly, a strategic seller that is not completely exiting through the transaction may have more certainty redeploying the sale proceeds into its business if the risk of a post-closing rep breach claim has been reduced or eliminated through the use of RWI.

However, the use of RWI is not a panacea. A RWI policy will generally not provide coverage for known contingent liabilities, so even if the seller is not generally liable for breaches of its representations and warranties, a buyer may still require a special indemnity, and potentially a corresponding escrow, for any known issues that it identifies during its diligence.

Additionally, where the transaction involves a staggered sign and close, the buyer will not have coverage for representation and warranty breaches that first arise or that the buyer learns about, between signing and closing. This aspect of RWI means that information learned by a buyer through interim period disclosure schedule updates and amendments by the seller could result in exclusions from coverage. While a buyer may typically push for a more fulsome obligation for the seller to update its disclosure schedules, in the context of a transaction utilizing RWI, a buyer may have greater certainty of coverage if the seller's obligation to update its schedules for breaches of representations and warranties is limited to those that are necessary for the seller to "bring down" its representations and warranties at closing.

In addition, RWI will generally not cover breaches of covenants, so the parties will still need to address the appropriate indemnity structure for losses arising from covenant breaches.

Other potential sources of exposure in A&D transactions would also need to be considered, including special warranty of title claims and common "retained" liabilities. However, as RWI has been used more frequently in A&D transactions, some of these concerns have been alleviated by shifting certain of these potential sources of liabilities (that would commonly be addressed in a conveyance or other portions of the purchase agreement) into representations and warranties, some of which may be covered by the policy and in certain circumstances, but including stand-alone coverage for special warranty of title under the policy. Buyers should keep in mind though that this approach would mean that certain claims that might otherwise be a dollar one recovery under a traditional seller indemnity would now be subject to the RWI policy retention amount (i.e., the policy deductible).

Benefits of RWI for buyers

In any transaction, the buyer and its valuation will be particularly focused on the risk

profile of the underlying assets, with the buyer also being motivated to maximize, to the extent possible, its protection against unknown liabilities that the buyer has not factored into its price. Either a traditional seller indemnity or RWI can provide the protection a buyer seeks. However, given the nature of an RWI policy, a buyer may, in certain instances, find that the coverage under the RWI policy provides certain advantages to a traditional seller indemnity.

Scope of representations and warranties. In "no survival" transactions (i.e., where the acquisition agreement is structured so that the buyer only looks solely to the RWI policy for breaches of seller's reps and warranties), sellers are generally more accommodative when negotiating the scope of its representations and warranties, as the seller's exposure is more limited, meaning that the buyer may obtain a more fulsome (and/or less qualified) set of reps and warranties for purposes of buyer's post-closing protections. Please note, however, that sellers will still keep in mind the impact of the seller's representations and warranties on its scheduling burden and the closing conditions under the purchase agreement, as well as the seller's potential exposure for fraud with respect to the representations and warranties.

Survival periods. In addition to a potentially broader set of seller representations and warranties, the policy term will generally survive for three years with respect to most representations and warranties, with fundamental representations and warranties surviving for six years, giving buyers additional coverage beyond what they likely would receive absent RWI. In transactions in which RWI is being used as an alternative to an indemnity escrow, absent RWI, the seller will be increasingly motivated to limit exposure by pushing for short survival periods and thus a faster release of any held-back funds.

Scope of losses. While a technical point, buyers should keep in mind that the scope or types of losses covered by RWI is often broader than those recoverable under a purchase agreement utilizing a traditional seller indemnity. Generally, an RWI policy will not include broad damages exclusions, such as exclusions for consequential damages, lost profits or damages based on multiples of earnings, to the extent such types of damages are not prohibited or excluded under the purchase agreement. In transactions utilizing RWI, buyers should try to push back on broad damage exclusions in the acquisition agreement since those exclusions may narrow the buyer's coverage under the RWI policy.

Amount of coverage. An additional consideration for buyers implementing RWI is the amount of coverage. While a seller will customarily insist that its post-closing liability under the acquisition agreement is capped at a small fraction of the purchase price, there is generally no limit to the amount of coverage a buyer can purchase under an RWI policy. This optionality for buyers to purchase additional coverage can provide a meaningful risk management benefit when compared to the more rigid indemnity caps and escrow amounts (which rarely exceed 10% of the purchase price) associated with traditional seller indemnities.



“As A&D activity rebounded following the worst of the pandemic, dealmakers have increasingly implemented representation and warranty insurance.”

Other considerations

Costs. The cost of an RWI policy will need to be allocated between the parties. While it is common for the buyer to pay for the policy premium, the buyer's valuation or bid will nevertheless take this additional expense into account. In this regard, parties will also need to keep in mind that the RWI market remains dynamic, and pricing fluctuates based upon market demand and insurer capacity, among other factors. Over the past five years, this market fluctuation has resulted in premiums ranging from as low as 2% of the coverage amount to, at times, more than 6%.

Additionally, for smaller transactions, dealmakers should keep in mind that most insurers will require a minimum premium amount, meaning that RWI may not be as cost-effective and appear comparatively more expensive for smaller transactions. The underwriting process is costly for insurers, so they will charge the buyer an underwriting fee (often \$30,000 to \$60,000), and if the buyer does not have exclusive negotiating rights with the seller, the insurer customarily also charges an additional underwriting premium, currently ranging from \$50,000 to \$250,000, depending on deal size. These underwriting costs will generally be applied to the policy premium if a policy is ultimately bound but particularly in situations in which a bidder cannot obtain exclusivity due to there being multiple bidders remaining in the process. This additional cost should be kept in mind, and if the buyer is able to successfully negotiate an expense reimbursement or similar arrangement with the seller, these costs should be taken into account.

Retention/deductible. Similar to a basket or deductible construct in a traditional seller indemnity, coverage under the RWI policy will be subject to a retention amount (i.e., a deductible), which typically ranges from .75% to 1% of the purchase price, depending on deal size, for the first 12 months post-closing, often reducing to .5% thereafter. In some instances, a buyer will ask the seller to bear some portion of losses within the policy retention amount. For instance, a common construct is that for the first 12 months following closing, the seller will bear the first 50 basis points of losses arising from

“In transactions in which RWI is being used as an alternative to an indemnity escrow, absent RWI, the seller will be increasingly motivated to limit exposure by pushing for short survival periods and thus a faster release of any held-back funds.”



breaches of the representations and warranties, with the buyer bearing the next 50 basis points of losses. However, buyers should weigh the additional costs of this structure, such as the incentive this structure creates for the seller to potentially negotiate a more narrow rep package and the costs required to negotiate the required indemnity mechanics, against the benefits that a nominal indemnity provides.

Timing. A practical consideration that will need to be considered at the outset of any transaction is the timing to get to signing. If the buyer is well-prepared, the use of RWI may expedite signing, as it can significantly reduce the amount of time required to negotiate the acquisition agreement by eliminating meaningful back and forth regarding the representations and warranties and the indemnity section. The process to underwrite and negotiate an RWI policy often takes two to three weeks. While RWI underwriting can often be expedited, it is not uncommon for A&D transactions to move rapidly, especially in a competitive situation or in a volatile commodity price environment.

In some instances where timing is paramount, a buyer can also consider binding the RWI policy after the acquisition agreement is signed, as most A&D transactions will have an interim period between signing and closing for purposes of the title and environmental defect process. The risk of this approach is that unexpected policy exclusions may arise during the underwriting process, at which point the buyer would not be able to negotiate recourse for those excluded losses with the seller.

Due diligence. The RWI insurer's diligence process primarily consists of underwriting the buyer's due diligence. This insurer's advisors will review the buyers diligence reports and schedule a call with the buyer's deal team, consultants and advisors to discuss and confirm the scope of due diligence that was conducted. Any material issues discovered during the buyer's diligence, and any perceived deficiencies that are identified in the buyer's diligence, may give rise to exclusions under the policy. Therefore, the buyer will need to ensure that fulsome due diligence is conducted to minimize exclusions under the RWI policy. 

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HYDROGEN: AN ENERGY TRANSITION WORK IN PROGRESS

The role of hydrogen in the world's clean energy future depends on its ability to overcome challenges, including cost, scale and demand, experts said during the World Hydrogen North America conference.

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ILLUSTRATION BY
ROBERT D. AVILA

As emissions rise with growing industrial activity and populations, energy regulators say it is time to stop talking about hydrogen and start acting on steps needed to make development and production of the clean energy source at scale a reality.

"Leaders around the world, not just from the government side but from the private sector side, have put net-zero commitments on the table. The challenge is what are we doing in the near term?" said David Turk, deputy secretary for the U.S. Department of Energy (DOE), after referring to the latest report by the U.N.'s Intergovernmental Panel on Climate Change. "Are we doing enough in the near term to be able to get us on a trajectory to be successful to those net-zero goals by 2050? The short answer is no. We're not doing enough."

Speaking virtually during the World Hydrogen North America conference in Houston, Turk said there is no silver bullet or one technology that will solve emission challenges in each sector, and some technologies have broader applications than others.

"In that context, hydrogen becomes particularly attractive. If we can reduce those costs and actually get clean hydrogen at scale out there in the real world, [with] the versatility of hydrogen, it can be a part of the solution on the power side, on the transport side," Turk said, "especially in those harder

to decarbonize heavy-duty truck applications; on the industrial side, where we don't have easy, cost-effective solutions for a number of industrial processes like steel manufacturing. Hydrogen can play a very versatile role."

Hopes are high on hydrogen's decarbonization ability. Plentiful in supply, hydrogen has near-zero greenhouse-gas emissions, and it generates electricity with water vapor and warm air as the only byproducts. However, the role of hydrogen in the world's clean energy future depends on its ability to overcome challenges including cost, scale and demand.

"We've seen some phenomenal cost reductions in a range of cleaner technologies—solar PV, wind, battery technology, etc. But if we're going to have clean hydrogen ... we need to really reduce that cost significantly," Turk said. He later added, "You've got to build out and match the supply and demand."

It's the reason why the DOE launched the Energy Earthshot program targeting hydrogen last year, aimed at reducing the cost of clean hydrogen by



80% to \$1 per kilogram within a decade, and a program called H2 Matchmaker. The online information resource, as explained by the DOE, helps hydrogen suppliers and users find ways to connect to establish regional hydrogen hubs.

"We know that hydrogen hubs bring together stakeholders from across the value chain and ensure supply [and] demand at the same pace are key to early deployment," said Glenn Hargrove, assistant deputy minister, fuels sector, Natural Resources Canada, where such a hub is being created in Alberta's Edmonton area.

More than 25 projects related to the production, transportation and end-use of hydrogen are underway at the hub, which Canada plans to use as a blueprint for other regions across the country, according to the hub's website.

"This includes the largest clean hydrogen production facility in the world with existing CCUS technology and the hydrogen and dedicated CO₂ pipeline, with new deployments planned for trucks and refueling infrastructure," Hargrove said. "Production is growing across the country as well. Canada sees all pathways to clean, low-cost, low-carbon hydrogen as essential to grow the market."

Additional investments include plans for 20- and 80-MW electrolyzers and seizing opportunities to produce hydrogen using the country's natural gas reserves and renewable energy resources.

"Some studies have shown that there is significant wind and hydro capacity across the country that produce more than 40 megatons of renewable hydrogen every year, far exceeding Canada's expected demand," Hargrove said. "So, hydrogen will be available for export, and our leading companies are already exporting the products around the world."

The U.S. is also working to advance the hub concept after the DOE landed \$8 billion in funds thanks to the bipartisan infrastructure plan, which became law in November. The dollars will fund at least four hydrogen hubs across the U.S. to improve clean hydrogen production, processing, delivery, storage and end-use. Hubs put



"Leaders around the world, not just from the government side but from the private sector side, have put net-zero commitments on the table."

— David Turk,
U.S. Department of Energy

supply and demand in close proximity.

Turk said the response to the \$8 billion worth of cost share for hubs has been

"overwhelming in a very positive way" as state and local leaders come together with businesses to put together "robust" proposals.

"That's where the costs are cheaper right now. That's where it's easier to do this and certainly get it to scale," he said of hubs' potential. "Take advantage of the fact that we do have an awful lot of hydrogen in our system currently used for fertilizer production, among other things."

Co-locating supply and demand reduces distribution and infrastructure challenges, he added.

In Canada, programs that can support hydrogen development include the \$1.5 billion Clean Fuel Fund, which supports the buildout of new clean fuel production facilities. These include 10 hydrogen projects and the Net Zero Accelerator program, which invests more than \$8 billion to drive down emissions from industrial sectors, Hargrove said.

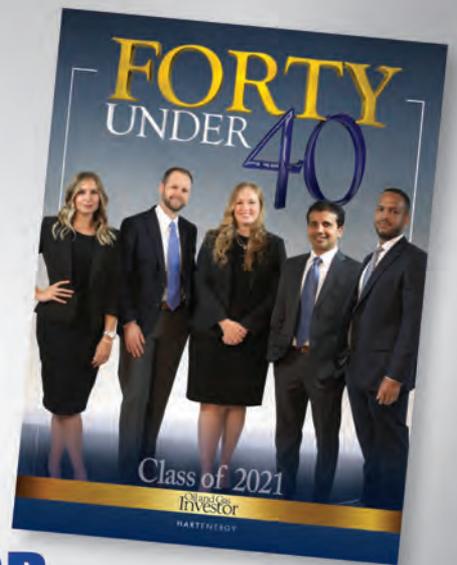
Canada and the U.S. are among the countries that have unveiled hydrogen strategies. Others include Chile, Germany, Norway and Spain.

"The fact that there are more than 20 countries that have released their own hydrogen strategies and somewhere in the neighborhood of \$80 billion in investments over the last 18 months speak to the momentum for hydrogen," Hargrove said.

Clean hydrogen can be a source of dispatchable power as well as a form of energy storage, Turk added, noting it is also an opportunity for job creation.

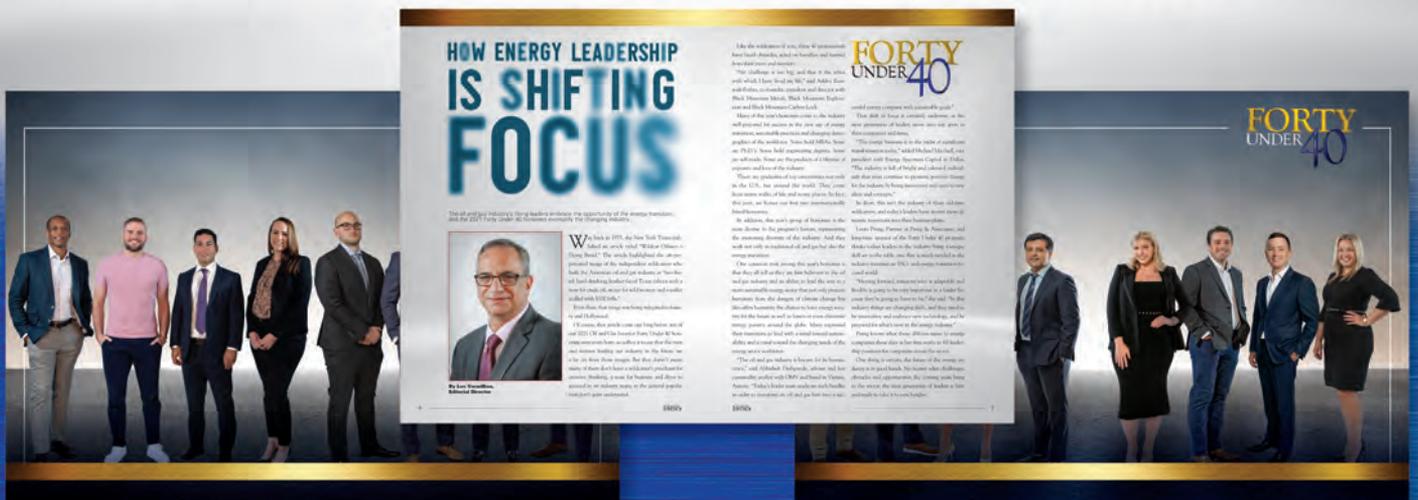
"There is no doubt a huge amount of buzz not only in Canada, not only in the U.S., but countries around the world," he said, "But what we need to do is not just talk about hydrogen. We actually need to act on hydrogen." 

FORTY UNDER 40



We invite you to **NOMINATE** those that are **MOVING INDUSTRY FORWARD**

Oil and Gas Investor is accepting nominations for the **2022 Forty Under 40 in Energy awards**. We encourage you to nominate yourself or a colleague who exhibits entrepreneurial spirit, creative energy and intellectual skills that set them apart. Nominees can be in E&P, finance, A&D, oilfield service, or midstream. Help us honor exceptional young professionals in oil and gas.



Honorees will be profiled in a special report that ships with the November issue of *Oil and Gas Investor* and on HartEnergy.com.

Nominees should display:



A desire to find new challenges



Community involvement



Leadership initiative



Creative problem solving

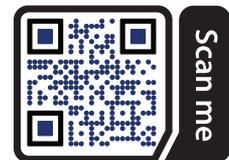


Professional excellence



Entrepreneurial spirit

Events Calendar



The following events present investment and networking opportunities for industry executives and financiers.

EVENT	DATE	CITY	VENUE	CONTACT
2022				
Offshore Technology Conference	May 2-5	Houston	NRG Park	2022.otcnet.org
Energy Transition Capital Conference	May 10	Houston	Omni Houston	hartenergyconferences.com
ASA Energy Valuation Conference	May 12	Houston	The Briar Club	houstonappraisers.org
Carbon Management Conference	May 16	Fort Worth, TX	Fort Worth Convention Center	carbonmanagementconference.com
DUG Permian/Eagle Ford	May 16-18	Fort Worth, TX	Fort Worth Convention Center	dugpermian.com
AGA Financial Forum	May-16-19	Miami Beach, FL	Loews Miami Beach Hotel	aga.org
Williston Basin Petroleum Conference	May 17-18	Regina, SK	Delta Hotels Marriott Regina	wbpc.ca
DUG Haynesville	May 25-26	Shreveport, LA	Shreveport Convention Center	dughaynesville.com
Mexico Gas Summit	June 1-2	San Antonio	St. Anthony Hotel	mexicogassummit.com
Louisiana Energy Conference	June 2-3	New Orleans, LA	The Ritz-Carlton New Orleans	louisianaenergyconference.com
CIPA Annual Meeting	June 9	Carlsbad, CA	TBD	cipa.org
DUG East	June 13-15	Pittsburgh	David L. Lawrence Conv. Ctr.	dugeast.com
Unconventional Resources Technology Conference	June 20-22	Houston	George R. Brown Conv. Ctr.	urtec.org
DUG Bakken and Rockies	June 28-29	Denver	Colorado Convention Center	dugrockies.com
SPE Innovation & Entrepreneurship Summit	July 13-14	Houston	Norris Conference Centers, CityCentre	speecs.org
IPAA Annual Meeting	July 20-22	Colorado Springs, CO	The Broadmoor	ipaa.org
IAEE Annual Conference	July 31-Aug. 4	Tokyo	National Graduate Institute for Policy Studies	iaee2022.org
EnerCom Denver	Aug. 7-10	Denver	The Westin Denver Downtown	enercomdenver.com
Western Energy Alliance Annual Meeting	Aug. 10-11	Beaver Creek, CO	Park Hyatt Beaver Creek	westernenergyalliance.org
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GPA Midstream Convention	Sept. 11-14	San Antonio	Marriott Rivercenter	gпамidstreamconvention.org
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PHMSA PAVES THE WAY TO NET ZERO

The use of artificial intelligence, such as prescriptive analytics, plays a critical part in operational efficiency for midstream pipeline companies.

ARTICLE BY



JASON CHADEE

ILLUSTRATION BY
ROBERT D. AVILA

Despite the continued calls for a low-carbon future and net-zero emission targets, the U.S. continues to rely on pipelines for the safe and clean transport of crude, petroleum and natural gas from well-heads to gathering and processing facilities and then to refineries and tanker loading facilities. In 2021, more than 9,000 miles of oil and gas pipelines were being built or expanded in the U.S., and another 12,500 miles were approved or announced.

The infrastructure is critical to national security because of the materials transported and their effect on energy, water and wastewater, chemical and transportation systems. Although safer than transportation by road, rail or barge, pipelines are not without fault. In 2018, the Transportation and Security Administration (TSA) reported that it expects pipeline companies to report approximately 32 security incidents annually—both physical and cyber.

The pressing problem

Of the almost 2.8 million miles of pipelines spanning the nation, many are operating beyond their design service life. Pipeline owners, operators and engineers continually face the potential of corrosion, welding or equipment failures, as well as excavation damage, freeze-thaw cycles, soil erosion or other external applied forces. The National Transportation Safety Board pointed to aging pipelines as a particular concern in its news release “2019-2020 Most Wanted List of Transportation Safety Improvements.”

Pipeline and Hazardous Materials Safety Administration (PHMSA), a U.S. agency housed within the Department of Transportation, is responsible for much of the monitoring and enforcement of pipeline safety in the U.S. When originally established in the early 1970s, PHMSA’s pipeline safety regulations were based primarily on industry consensus standards in effect at the time. Given the age and condition of older pipelines, PHMSA has refocused its attention on regulation of pipe replacement, modernization projects and work packages, older

pipeline records, safety management systems and other issues related to high-risk, aging pipelines.

In 2020, Congress enacted the Protecting Our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act designed to strengthen PHMSA’s safety authority and includes mandates and provisions to expand its mission related to protecting the environment. But the PIPES Act came without additional resources, which means PHMSA must do more within its current parameters.

Monitoring and maintenance approaches are costly and inefficient because pipelines are often installed on a large scale and in inaccessible and hazardous environments. Physical inspections have typically involved smart Magnetic Flux Leakage “pigs” that travel through the pipelines and scan the pipe walls. They were considered the best tool in the industry for the job, yet by PHMSA’s own admission, they are not failproof.

Some midstream companies have adopted the industrial internet of things (IIoT), so decision-making units that might otherwise have billions of dollars’ worth of revenue stuck in uncommunicative environments can rely on large sets of data. The adoption of IIoT, although beneficial for detecting and controlling anomalies and optimizing and predicting, creates a double-edged sword. Most IIoT data are not used, which greatly reduces the potential economic value the IIoT enables, and it potentially opens the doors for malicious actors to exploit vulnerabilities.

A compromised pipeline system could result in explosions, equipment destruc-

tion, unanticipated shutdowns or sabotage, theft of intellectual property and downstream impacts to National Critical Functions and, therefore, impact national safety and business success.

The TSA has advocated for voluntary pipeline cybersecurity standards for two decades. In 2021, TSA issued mandatory cybersecurity rules on owners and operators of pipelines to protect against ransomware attacks and other known threats to information technology and operational technology systems. Owners and operators are now required to develop and implement cybersecurity contingency and recovery plans and conduct a cybersecurity architecture design review.

AI as the solution

The challenge for midstream is in capturing and converting numerous data sources into a singular data warehouse or knowledge bank to be used to increase their ability to observe and determine the efficiency and efficacy of their pipelines while providing appropriate and mandated maintenance, compliance and security.

Predictive analytics have been a midstream mainstay for the past decade, with the most common uses in indicating performance problems or asset health deteriora-

tion in advance of control systems or SCADA warnings. But pipeline monitoring and maintenance strategies are evolving along with advances in technology.

Where predictive analytics uses data analysis to anticipate the likelihood of potentially disastrous events, prescriptive analytics uses historical and current data to pinpoint why an event will happen and how to rectify the problem. Predictive analytics bridges the gap between anomaly detection and the actions needed for resolution.

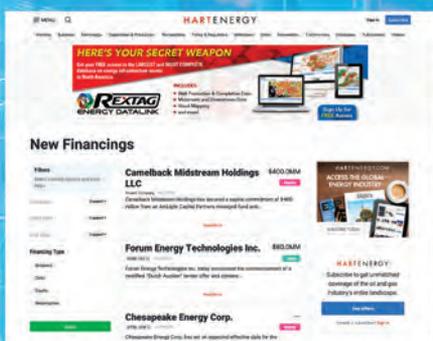
Prescriptive analytics relies on machine learning algorithms that use historical data as input to predict new output values, allowing computers the ability to make decisions based on statistical data relationships and patterns. Prescriptive analytics can understand unstructured data with natural language processing to improve the decision-making process. It can recommend potential plans of action, analyze the ramifications of each possible choice and even help set a chosen plan into motion.

Because machine learning is a continuous process, such an application will continue to improve over the life of an asset by analyzing new data to learn an asset's behavioral patterns. 

Jason Chadee is the director, energy sales, of SparkCognition and leads the oil and gas industry sales team. He brings over 25 years of experience in upstream oil and gas, power systems and wind energy. Prior to joining SparkCognition, Jason spent 17 years with Schlumberger in various senior roles for software and digital solutions sales and in global IT supply chain. He holds an M.Phil. in electrical and computer engineering and is the author of 13 peer-reviewed publications.

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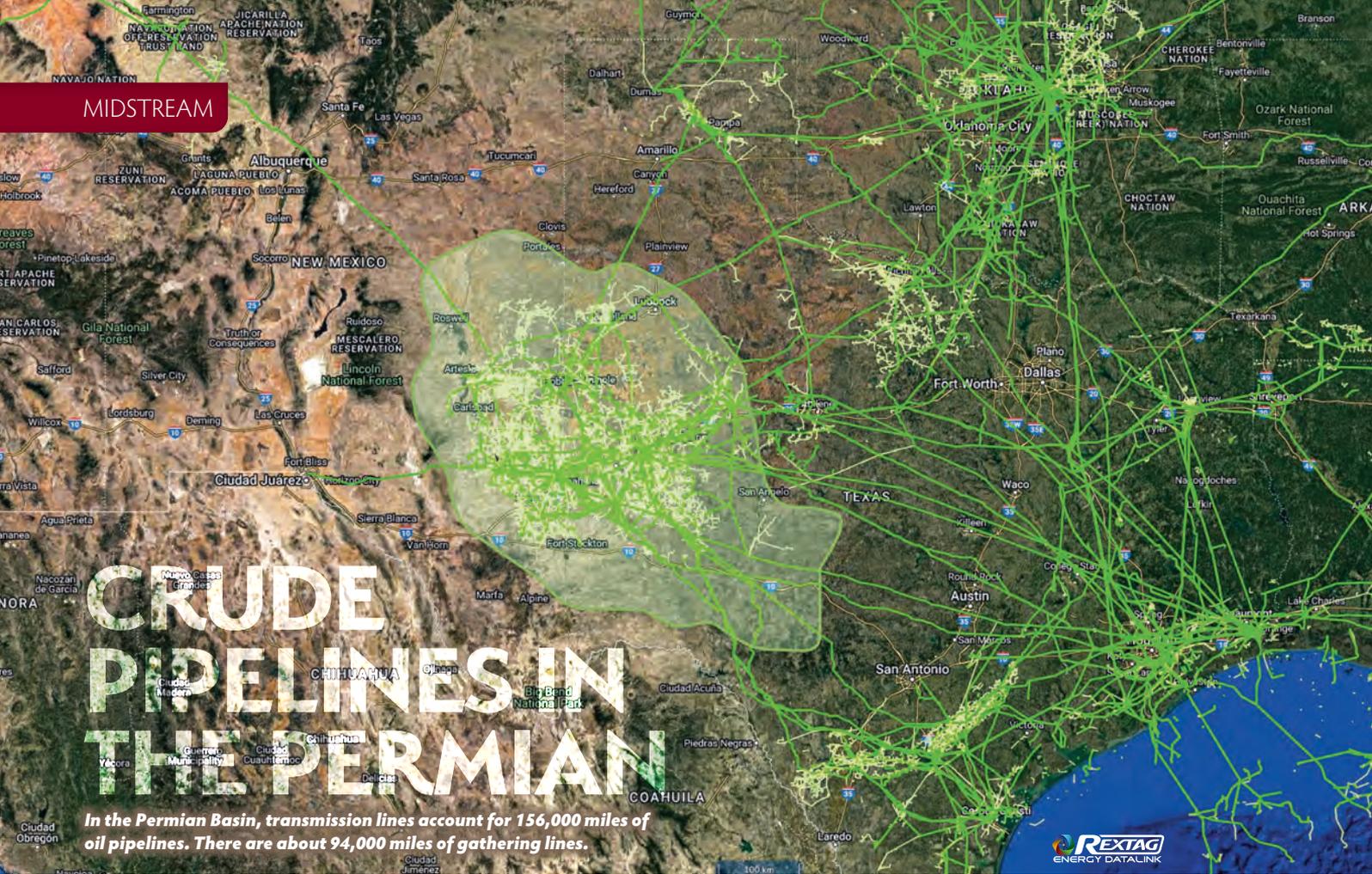


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STARTUP Q&A: FORMER NASCAR DRIVER'S ROAD TO ENERGY SOFTWARE SUCCESS

Once Ricky Ehrgott aimed to win races on the track. Today, he is winning over energy producers and helping to digitalize the energy sector.

ARTICLE BY



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ILLUSTRATION BY
ROBERT D. AVILA

Ricky Ehrgott dreamed of being a race car driver. Unlike many young boys with the same dream, he had the talent to make it to the track before a nasty accident derailed his career. But that wasn't the end of his dreams.

Fueled by a desire to succeed and experience from his father's startup, Rev1 Energy, Ehrgott moved from the track to the C-suite where he now serves as CEO of the project management software company that began in his childhood home.

Len Vermillion: How does a former NASCAR driver end up creating software for the oil and gas industry?

Ricky Ehrgott: My dad owned Indy cars so when I was fifth grade and I was going to the Indianapolis 500, and it was just something that really caught my attention; it's something I've always wanted to do.

I started racing when I was around 14 or 15 years old and raced open-wheeled cars, and then raced into trying to do Indy cars but then had an accident and tore an artery in my neck.

It set me back quite a bit, I was out for two or three years. So, you can imagine, if anytime you have the upward momentum in sports, if you get that momentum taken away, it's pretty challenging to get that back.

LV: You had a place to go from there since you had experience with Rev1 Energy. What does the software do?

RE: Rev1 Energy is a commissioning services organization that I run, and we really focus on helping projects run smoother by providing really successful teams and philosophies to the project. So, throughout our energy experience, we've worked on a lot of different projects, a lot of different assets around the world, and we bring that knowledge to every project.



LV: What kind of interesting projects have you been involved with?

RE: One of the interesting projects I think in recent times is we've been kind of brought in on some of these newer renewable natural gas projects. And it's pretty exciting to see the legacy companies, I won't be able to name any names, but the legacy companies that are involved.

They're very large, very well-known companies and have started to pivot into these different areas, and they see an opportunity to capitalize on investing in these projects.

What they're doing is basically capturing methane from these cattle farms and converting it into renewable natural gas. So, it's an exciting time to be a part of these projects. I always say here at Rev1 that we're pretty much project agnostic. We don't care what the project is or where it's coming from or where it is in the world, we just like to be a part of it. So, that's probably one of the coolest things we've been involved in recent times.



LV: While Rev1 isn't necessarily a new company, the software is very new. How has it been received?

RE: Obviously, I'm biased, but everybody we talk to, it does seem that they really have a genuine appreciation for how easy the software is to use. What we're trying to do is take the approach that we're not really a software company; we do build software but we're practitioners in the field. We go do these jobs every day. So, we're more of a partner to these organizations as opposed to, "Hey, here's the software, this is how you use it, now go use it. We're going to charge you every month for it."

It's more, "Here's the software, but here are the philosophies to go around the software," and we can basically package all this up into one large scope of work and provide all that support to a client or an EPC or an oil major, whoever it would be. So, it's a bit different than just a traditional software organization where they build the software in an office, they sell the software and the support is there, but it's not really boots on the ground support.

LV: When exactly did you leave NASCAR and start running Rev1?

RE: It was around 2014. I got out of racing in 2013. I made the decision, should I be a struggling race car driver the rest of my life or should I make the decision to go into business and maybe someday own a race team? So, that's really when I made the decision to transition over to the energy space, and it was a good time because my dad was at the point where he was wanting to take a step back and not want to work as much. So, it worked out really well.

LV: Where does Rev1 go from here? What's the future plan?

RE: We have the software division. We have the oil and gas division, the power division. So, we've really expanded a lot. I think even people that have seen Rev1 in the last five, six years would be drastically surprised at the difference that they would see in the company today.

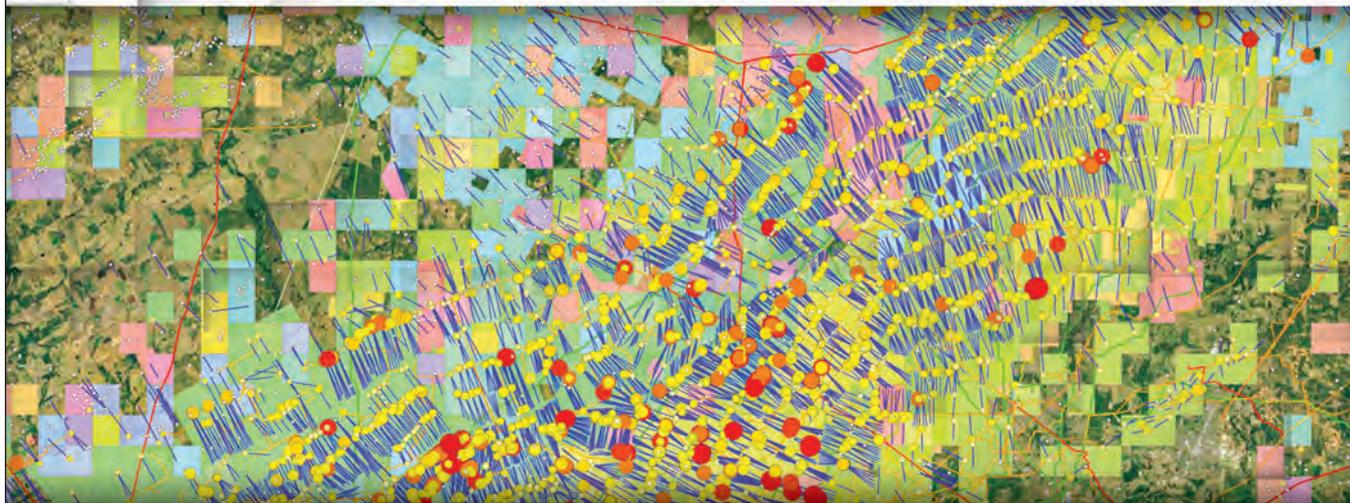
LV: Let me ask you then about digitalization in general. It's come a long way obviously since 2001, probably even since 2016. Where do you see that going?

RE: I think digitalization is something that you have to have just to stay competitive. It's not an edge anymore. So, if you have digitalization in your organization, you're not getting an edge on anybody, you're just staying competitive in the market. I think companies that don't adopt streamline digitalization process are going to fall all by the wayside in the next five to seven years. 

Read the full interview, including more on projects, the company and Ehrgott's experiences in racing. And, just what did happen in the accident?

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ENABLING EFFICIENCY, SAFETY THROUGH DIGITIZED COMPLETIONS

Through digital completions technology, oil and gas producers can increase safety and efficiency at the well site by converting on-paper procedures to a digital forum.

ARTICLE BY



MADISON RATCLIFF

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As more oil and gas producers begin the process of digitizing their work sites, many have seen increases in productivity and efficiency, according to Intelligent Wellhead Systems CEO William Standifird.

Whereas plans and scheduling at an oil and gas well site used to be done manually with a piece of paper on a clipboard, Standifird said digitization now connects workers all across the field and keeps everyone updated on changes, cutting downtime by a considerable amount. In addition to saving time and resources, digital completions decrease the chances of human error, ultimately improving the safety of a well site.

"I don't think very many of us fly planes without an autopilot there, and without digital instrumentation, we would be very uncomfortable," Standifird said. "Completions side is really no different."

In the SPE webinar "Unconventional Well Digital Completion Technology Best Practices," Standifird gave examples of how his company's software is making a positive impact on well sites, as well as listed his five best practices for digital well completions, which include implementing:

1. Wellsite safety practices;
2. Digital lockouts;
3. Sensors;
4. Valve positioning; and
5. Digital handshakes.

"We're a very procedure-driven industry," he said. "What we do is we codify processes, and historically we've codified those things on paper. We have clipboards, we have checklists and we have various operational procedures—the job safety analysis, for instance, management of change process.

"One of the things that's really important for completions is migrating those processes and procedures from clipboards and paper documentation or even verbal documentation to codified software processes."

Using this digitization technology, one Intelligent Wellhead Systems client was able to conduct a well swap, a process that ordinarily would take 12 to 14 hours, in 39 seconds in the Denver-Julesburg Basin, according to Standifird.

"If you want pump time, you want up time and you want to avoid mistakes, that's what these types of technologies really help you do," he said. "When you codify a procedure electronically, then the humans

are not having to second-guess where they are in the procedure every time."

"It's sort of like using Google Maps or Waze to drive to a destination," he continued. "Because [the GPS system is] guiding you, and you can see the compass, and you can see the road, and you can see the next step. It allows you to move very fast, and that's what these technologies allow you to do."

The digitization process is not only improving efficiency but also safety on the well site by keeping all workers up-to-date on any occurring changes and risks, as well as reducing the number of mistakes that can lead to injury.

When prioritizing the two qualities of efficiency and safety, Standifird said safety will always come before efficiency, but the digital completion technology is fortunate enough to check both boxes.

"As much as we depend on humans every day for their innovation, for their dedication to the work, at the end of the day, humans are typically responsible for making mistakes that result in lost time and injury, so the computers and digitalization can really help us move completions forward faster and more safely," he said.

Ultimately, the digital completions process ties together an entire team of people and ensures that they are all on the same page throughout each stage of the completions process.

"I understand how difficult it is to have operations with thousands of people where you're trying to instrument a process to prevent bad things from happening," Standifird said. "Humans ultimately are not as good at consistently applying processes as computers are, so by codifying certain things and taking that decision making away from the human or augmenting the human's decision-making, you just end up with a lot better results." 

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EDITOR-AT-LARGE

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Americans appear to agree: leave Russia, take the earnings hits.

While American stocks' exit is disappointing, the disappointment is not derived from losing a few or many dollars; it's because of why it's necessary: to discontinue a relationship with (let's say it) a monster.

In a world that has evolved to 2022, this isn't supposed to happen anymore. In ancient history, whole villages were destroyed, the occupants killed in the pursuit of territorial expansion. Modern warfare more commonly attempts to avoid civilians.

Yet, here we are: One person in Russia wants to take over another nation and is destroying whole cities and their occupants.

At some point in the future, some or all will be rebuilt. It reminds me of the 19th century French economist Frederic Bastiat's "broken window fallacy": destruction isn't an economy. Economies lift people from the multitudes of depths of insecurity; destruction undoes this and sets the whole world that much further from lighter concerns, such as the price of Starbucks stock.

In terms of depths of misery, Ukrainian parliament member Anastasia Radina spoke vividly in response to questions by a CNN interviewer in mid-April. A question: Will Putin's appointment of the Russian general known as "the Butcher of Syria" result in "more hell on the battlefield?"

Radina said, "I don't think we can differentiate between 'stages of hell' that Ukraine is now going through."

Dante named nine. As of writing this, the Ukrainian people were entering the 49th.

Further giving clarity to what was at stake by Ukraine's defiance of Russia, Radina pointed out that "right now it is Ukraine and Ukraine's forces who are fighting for every inch of NATO territory. ... This is not just our war. This is the war of the whole world."

Can peace be achieved via concessions? "Concessions to Russia' is not the way to establish peace in Ukraine." In 2014, as to eastern Ukraine, including Crimea, "We were told [by the West] not to escalate, and we were told that would bring peace.

This never happened. ... And where did that bring us?"

In summary, "The only way to actually establish peace and freedom and the very existence of Ukraine is to win on the battlefield."

A YouTube vlogger, "4K Urban Life," posts un-narrated walking tours of European cities, including many in Ukraine. I found these while wanting to know what Ukraine looked like. Among the posts is a three-hour walk through Kharkiv in 2020. Young couples, children playing, picnics, parents strolling babies, people dining at street-side cafes, public art and enormous parks.

An excerpt from the "About" description read, "Enjoy the calm atmosphere of the city. Admire the urban architecture and quiet cobblestone streets." Now, this is no more.

When Americans and other NATO allies began investing in Russia after 1990, it was heralded as a great new opportunity—cultivation of economic ties that should ensure peace. "Glasnost."

I was leery. The country's people were many generations removed from anything resembling transparent capitalism and had never known a true democracy. The last semblance of eventually achieving this ended in 1917.

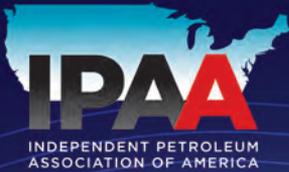
"Fresh Air" host Terry Gross interviewed Marie Yovanovitch, former U.S. ambassador to Ukraine, on March 15. Her take on the stakes is similar to Radina's—that Ukraine's fight is a fight for all of NATO.

"If [Putin] is successful in Ukraine, I think he will continue to move forward," Yovanovitch said. "Maybe not immediately because he's bitten off an awful lot with Ukraine."

But Putin invaded Georgia in 2008 "and got away with it." In 2014, he invaded eastern Ukraine "and got away with it." Today, "he's invading Ukraine again."

"We need to make sure he doesn't get away with it because if he does, then I think there is the likelihood that at some point he will continue moving west."

She concluded, "The kind of world we're going to be living in, when this is all done, is being determined now." 



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THE WORLD NEEDS WHAT WE PRODUCE NOW MORE THAN EVER.

AT CONTINENTAL RESOURCES, we are proud to be a leader in the most important industry to impact quality of life for mankind – providing affordable, reliable, abundant, clean energy for the world.

We can imagine a time in which the rest of the world lowers emissions as quickly as America has. Where clean energy is abundant and affordable. Where conflict over energy supply ends forever. All thanks to the bounty of American light sweet crude oil and natural gas.

At Continental, we helped America achieve energy independence, led the efforts to lift the oil export ban, and led the charge to create a new pricing marker for American crude oil. We were the leading pioneer in horizontal drilling – the first to develop an entire oilfield with this technology. We will always be a proud advocate for our domestic energy industry and all of its benefits including the life-changing virtues it delivers.

These virtues of American energy are incredible: lower energy prices for every American family; trillions of dollars flowing back to America as a result of producing American petroleum versus imported petroleum. This provides energy independence, giving us economic and geopolitical security.

American energy producers have the opportunity and resource to meet the energy needs of our country and our allies, to ensure our national security, and to protect our way of life. Continental will continue to lead the way.

