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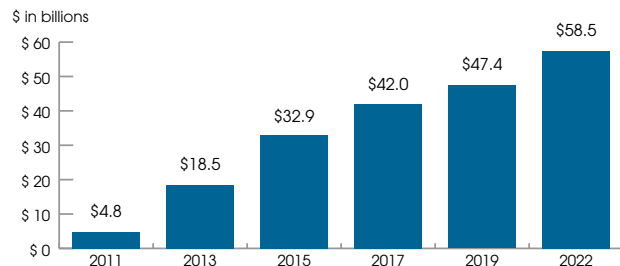
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Transactions Closed since 2009

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Keith Behrens, Managing Director, Head of the Energy Group • 214-258-2762 • keith.behrens@stephens.com

Charles Lapeyre, Managing Director • 214-258-2784 • charlie.lapeyre@stephens.com

Paul Moorman, Managing Director • 214-258-2773 • paul.moorman@stephens.com

Brad Nelson, Managing Director • 214-258-2763 • brad.nelson@stephens.com

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1616 S. Voss Rd., Suite 1000 • Houston, TX 77057
1.713.260.6400 Fax: 1.713.840-8585
HartEnergy.com

EDITOR-IN-CHIEF

Deon Daugherty • ddaugherty@hartenergy.com

MANAGING EDITOR

Brandy Fidler • bfidler@hartenergy.com

SENIOR ART DIRECTOR

James Milbrandt • jmilbrandt@hartenergy.com

SENIOR EDITOR, MARKET DATA

Joseph Markman • jmarkman@hartenergy.com

SENIOR EDITOR, ENERGY TRANSITION

Velda Addison • vaddison@hartenergy.com

SENIOR EDITOR, TECHNOLOGY

Jennifer Pallanich • jpallanich@hartenergy.com

SENIOR EDITOR, SHALE/A&D

Chris Mathews • cmathews@hartenergy.com

INTERNATIONAL MANAGING EDITOR

Pietro Donatello Pitts • pdpitts@hartenergy.com

ASSOCIATE DEVELOPMENT EDITOR

Jennifer Martinez • jmartinez@hartenergy.com

TECHNOLOGY REPORTER

Jaxon Caines • jcaines@hartenergy.com

ASSOCIATE EDITOR

Giselle Warren • gwarren@hartenergy.com

Hart Energy Editorial Management:

EDITORIAL DIRECTOR

Jordan Blum • jblum@hartenergy.com

SENIOR MANAGING EDITOR

Darren Barbee • dbarbee@hartenergy.com

EXECUTIVE EDITOR-AT-LARGE

Nissa Darbonne • ndarbonne@hartenergy.com

Creative Services:

CREATIVE DIRECTOR

Derick Baker • dbaker@hartenergy.com

Business Development:

VICE PRESIDENT SALES

Darrin West • dwest@hartenergy.com • 713.260.6449

DIRECTOR OF BUSINESS DEVELOPMENT

Jeremy Bunnell • jbunnell@hartenergy.com • 713.260.5204

DIRECTOR OF BUSINESS DEVELOPMENT

Morgan Mascio • mmascio@hartenergy.com • 713.260.4633

DIRECTOR OF BUSINESS DEVELOPMENT

Bailey Simpson • bsimpson@hartenergy.com • 713.260.4612

BUSINESS DEVELOPMENT MANAGER

Rachel Richards • rrichards@hartenergy.com • 713.260.4602

BUSINESS DEVELOPMENT MANAGER

Manal Foty • mfoy@hartenergy.com • 713.260.4653

ADVERTISING TRAFFIC MANAGER

Valerie Moy • vmoy@hartenergy.com

Hart Energy Corporate:

CHIEF EXECUTIVE OFFICER

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Rob Cravaritis

SENIOR VICE PRESIDENT, EVENTS

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BANKING 'CONTAGION' INFECTING OIL MARKET

Oil prices, E&P stocks and industry sector index continue to plummet as Feds grasp for stable ground.



DEON DAUGHERTY
EDITOR-IN-CHIEF
@Deon_Daugherty
ddaugherty@hartenergy.com

What does the industry at large have to fear from a few failing banks? Many of them have continued to keep oil and gas producers at arms' length—or further—since the shareholder uprising of 2017 demanded a slowdown.

But nevertheless, banking crisis and concern is a weight on consumer confidence, which in turn impacts spending and all things related to demand.

And therein lies the rub.

Inside the first half of March, two regional U.S. banks failed and a third one got perilously close. As the uncertainty spread around Wall Street, commodity futures took a dive along with that of many financial institutions and other sectors.

Barclay's revised oil price forecasts downward at the beginning of March to \$92/bbl Brent and \$87/bbl WTI. On March 17, Brent closed out trading at \$72.58/bbl, and WTI ended the day at \$66.37/bbl.

It was WTI's lowest point since December 2021.

Third time's the charm?

By mid-March, those two regional U.S. banks collapsed, and a third financial institution's existence was poised for collapse.

First, the implosion of California-based Silicon Valley Bank shook Wall Street. Then Signature Bank in New York went belly-up.

The Treasury Department has vowed to shield those with cash in both defunct institutions with a "systemic risk exception," an effort that Treasury Secretary Janet Yellen told Congress will protect the U.S. economy by strengthening public confidence in the nation's banking system.

Then the tremors started at First Republic Bank.

Yellen announced an emergency intervention designed to stave off additional panic with a coordinated \$30 billion infusion of cash deposits.

"They're trying to create a firewall to protect themselves from further angst about the banking systems and continued bank runs," Mark Zandi, an economist at Moody's Analytics, told The Washington Post. "It's about shoring up the weakest links in the banking system and, in so doing, inoculating themselves from the fire getting to them."

'People are afraid'

The banking contagion comes at a point ripe for something like chaos.

Several underlying weaknesses have raised concern about an economic slowdown even as the world emerged from its pandemic lethargy.

Employment doesn't seem as strong as U.S. Labor Department surveys would suggest, John Paise, president at Stratus Advisors, told Hart Energy. The jobs that are coming back are generally low-paying especially in the services sector where most of the growth is occurring. Wage growth remains anemic. Consumer debt is on the rise, along with interest rates. Housing values are declining. And then, there's inflation. "People are afraid," Paise said.

The nonpartisan, nonprofit business team of analysts at The Conference Board has reported slippage in consumer confidence with each monthly release of its index this year. The board's expectations index—a measurement of consumers' short-term outlook on income, business and labor conditions—fell to 69.7 in February from 76 in January.

Anything less than 80 often signals a recession within 12 months, according to the board's data. But it's also worth noting that the level has registered below that threshold for 11 of the last 12 months.

The fear factor doesn't stop at the U.S. border. Europe continues to struggle with energy prices and the ripple effects of Russia's war on Ukraine. Central banks are tightening. Bankruptcy is on the rise.

Demand for oil within the U.S. remains low, well below that of 2019. And demand from China, which most experts said would surge, is limping along. Meanwhile, supply is abundant.

"We have plenty of inventory right now," Paise said. "People are closing out their positions, and it's really creating pressure worldwide. We've hit \$65 and some change on WTI. So yes, there's a nervousness of that at this point."

Indeed, it appears the depth of crude's plunge is at the mercy of the macro.



Most U.S. producers can turn a profit at WTI prices lower than \$65, and indeed, many are much better-positioned to do so now than before thrift became a trend. Still, capital plans for the year are in place, and shareholders and investors have their own expectations for performance.

"They can keep going but [persisting \$65 WTI prices] will definitely have a negative effect," Paise said.

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COMPLEX ENVIRONMENT DEMANDS A PRAGMATIC APPROACH TO ENERGY POLICY



JACK BELCHER
CORNERSTONE
GOVERNMENT AFFAIRS

@JackBelcher1

jbelcher@cgagroup.com

As we move into spring, in addition to warming temperatures there seems to be a warming of disparate interests within the U.S. and globally about what it will take to address the goals of energy security and energy transition. While this subtle change by no means signals an end or even a pause in the bipartisan rancor in Washington, D.C., it does seem to indicate that there may be opportunities for bipartisan compromise on comprehensive energy legislation in the future.

In the current divided Congress, the chance of major legislation passing remains relatively low. The House of Representatives has passed a number of measures from committees such as energy and commerce, natural resources, and transportation and infrastructure that would address the concerns Republicans have around energy security, fossil fuels production and transportation, and nuclear energy. For instance, the natural resources committee passed the Transparency, Accountability, Permitting and Production of American Resources (TAPP) Act. Among other things, it requires the administration to issue a five-year offshore oil and gas leasing plan, repeals recent increases in federal oil and gas royalties and fees and reforms the National Environmental Policy Act to streamline permitting.

The plan is to bundle several of these committee-passed provisions and bring them to the House floor for a vote, which would likely pass largely along party lines before referral for consideration in the U.S. Senate.

Of course, the Democrat-controlled Senate will not rubber stamp any largely partisan and fossil energy-focused bill that comes out of the Republican House. Yet, Sen. Joe Manchin (D-WV), who chairs the Senate Committee on Energy and Natural Resources and often casts the deciding vote in the upper chamber, has unfinished business with permitting legislation that he unsuccessfully tried to pass through the Senate last year in conjunction with the Inflation Reduction Act (IRA). In this highly partisan Congress, the question is whether a compromise package on permitting can be agreed to that satisfies the needs and wishes of members of both the House and Senate.

As a pro-oil and gas Democrat who focuses on energy security and climate policy, Sen. Manchin has played a key role in pushing back on some of the administration's anti-fossil energy policies. He recently reacted to a leaked U.S. Interior Depart-

ment memo that demonstrated a climate-based bias against terms that would encourage participation in an Alaska offshore oil and gas lease sale, stating that he was "appalled by [the memo's] contents" and the administration's decision to put "their radical climate agenda ahead of the needs of the people of Alaska and the United States." He showed equal disdain for the Biden administration's decision to further delay the release of the Interior Department's 2023-2028 Offshore Oil and Gas Leasing Plan, stating, "I will hold their feet to the fire on this."

At the same time, administration officials struck a more conciliatory tone toward oil and gas at CERAWEEK by S&P Global conference in March. For example, U.S. Energy Secretary Jennifer Granholm acknowledged that "oil and gas is going to remain a part of our energy mix for years to come." She also talked about cooperation with the industry to decarbonize, focusing on grants and tax credits emerging from the IRA for carbon capture and storage projects, hydrogen, geothermal, battery storage and energy efficiency. She and other administration officials additionally acknowledged the critical role that U.S. LNG exports are playing in helping Europe meet its energy needs in the absence of natural gas from Russia.

Indeed, the themes at CERAWEEK focused on cooperation in the future to address decarbonization and climate goals while meeting the energy security needs of the U.S., Europe and the world. Even the tension that has existed with European countries over what they conceive to be "unfair trade advantages" for U.S. companies stemming from the IRA seemed to have subsided. Rather than confrontation, European delegations seemed more concerned about how to ensure they find opportunities to partner with U.S. and other global companies that are seeking to benefit from an ongoing decarbonization boom.

Make no mistake, the challenges for the U.S. oil and gas industry remain significant: maintain or increase production to supply the world while decarbonizing and facing pressure by Wall Street to uphold capital discipline and favor returns over growth. That is a tall order, with a multitude of pressures coming from numerous directions. Amid these challenges, let's hope that policymakers at home and abroad respond with the pragmatic approach to energy policy that is required in order to successfully navigate through this complex environment. **OCI**

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JOSEPH MARKMAN
SENIOR EDITOR,
MARKETS & DATA

@JHMarkman

jmarkman@hartenergy.com

A pair of star-crossed corporate entities—one in the Permian, the other in Appalachia—endowed with valuable assets; alas, their acreages are not contiguous.

We don't know if there was anything to the Bloomberg report that Pioneer Natural Resources explored a merger with Range Resources. We do know the market's cheerleaders for Range screamed, "Go for it!" while Pioneer's backers took more of a "wait, what?" approach.

And we know Pioneer's emphatic statement that it was "not contemplating a significant business combination or other acquisition transaction" resulted in a quick recovery for its jolted stock price while Range's shares—which jumped 12% on the news—swiftly deflated.

For its part, Range CEO Jeff Ventura told analysts his company was in a great position and didn't need to pursue any kind of merger or acquisition. Executives then dodged questions about whether discussions had actually taken place.

But news of this deal—that wasn't reflected more than just gossip run amok. The report was a representation, of sorts, of the state of energy M&A.

Pioneer is a preeminent oil-focused E&P in the Permian Basin. The Permian accounted for 28% of shale M&A deal value in 2022, Deloitte reported in its "Oil and Gas M&A Outlook 2023."

Range is a leading natural gas and NGL producer in the Marcellus Shale. Last year, 82% of global midstream deals involved natural gas infrastructure as control of the supply chain increased in importance.

The soaring price of oil in 2022 might have been enough on its own to trigger a transaction or 30, even in geographically disparate basins. But we live in a different world than when M&A deals were driven by the price of crude.

"The old drivers of M&A activity, such as investing and acquiring for growth and increasing market share, seem to have been replaced by new drivers," Amy Chronis, Deloitte's vice chair and U.S. energy and chemicals leader, said in the outlook's executive summary.

Topping the list of drivers is energy security, which emerged as a huge factor in M&A in the wake of Russia's invasion of Ukraine and subsequent drastic reduction of natural gas exports to Europe. LNG assets, in particular, have grown in importance as U.S. exports rose and gas prices skyrocketed in Europe and Asia last year.

Driver No. 2 is operational excellence, in which consolidation is a tool to increase efficiency and enhanced use of technology to increase

productivity. M&A in the Permian has revealed the power of capital discipline. As "drill, baby, drill" gave way to "chill, baby, chill," companies have emphasized acreage consolidation and strategic expansions.

In 2022, Permian deal valuations fell on a per-acre basis. It's not that surprising—most of the best acreage was gobbled up in previous years. But last year, the price per boe reached its highest level since 2014. That M&A declined in the richest basin during that time underscores how oil price has been dethroned.

A Pioneer-Range deal would have harkened back to the grow-grow days of the shale revolution. In the iPhone 14 era, investors are more interested in free cash flow.


But free cash flow as clean cash flow. Driver No. 3 shows how the energy transition casts its long, clean shadow over virtually all oil and gas activity these days. Clean energy accounted for about 15% of oil and gas M&A value in 2022, about 80% of which involved biofuels, and combined solar and wind assets.

Driver No. 4 illustrates oil and gas companies' incursion into clean energy. About one-third of joint ventures by oil and gas companies are now in the clean energy space, Deloitte said, citing data from Refinitiv Eikon. The highest numbers are in hydrogen and related fuels (ammonia, nitrogen, sustainable aviation fuel), trending toward a growing mix of sources, fuels and carbon-capture programs.

Finally, more than 70% of deals during the past five years involve a company buying another with a better ESG profile—marrying up in the energy transition sense. This is particularly the case with larger independents and supermajors buying ESG friendly assets. ESG plays less of a role in transactions made by smaller and mid-sized companies.

For the year ahead, Deloitte expects more of the same: a continuation of cautious consolidation and an accelerated pivot toward clean energy. Capital discipline encourages deals involving contiguous acreage, so no wandering eyes in the direction of other basins.

Threats to M&A activity include the macroeconomic and capital market environments, carrying with them the risks of a recession or slowdown. Geopolitically, the EU's embargo on Russian oil and global sanctions on Russia increase uncertainty generally, as well as in deal making.

And a weaker demand outlook for hydrocarbons driven by acceleration of the energy transition—well, nothing ruins the mood for consolidation like an existential threat. 

ACTIVITY HIGHLIGHTS

OIL PRODUCTION IN THE
PERMIAN BASIN AVERAGED
92.6 MMBBL
PER MONTH IN 2022.





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▶ ACTIVITY HIGHLIGHTS

PERMITS

Chevron Corp.'s announced 30% increase in its 2023 capex budget promises investment in "advantaged assets in the Permian Basin, Gulf of Mexico, Kazakhstan, Australia and elsewhere that we believe drive superior performance," Nigel Hearne, executive vice president for oil, products and gas, said at the company's annual investor meeting in late February.

So far, Chevron is on track to make good on its pledge. The company tops the leader board for well permits issued over the past month, splitting them between Midland and Culberson counties, Texas.

No. 2 on the board is Caerus Oil and Gas LLC. The Denver-based company is owned by Anschutz, Oaktree Capital and Old Ironsides Energy. It produces natural gas in western Colorado's Piceance Basin and in the Uinta Basin in Utah. Caerus operates 7,400 wells on 680,000 net acres.

Colorado's Weld County was atop the list of counties this month, and its Garfield County rounded out the top 10. Texas counties in the Permian Basin continued to dominate the list.

Permitted Wells By State

State	Well Count
Texas	428
Colorado	280
Oklahoma	90
North Dakota	71
Louisiana	40
Wyoming	32

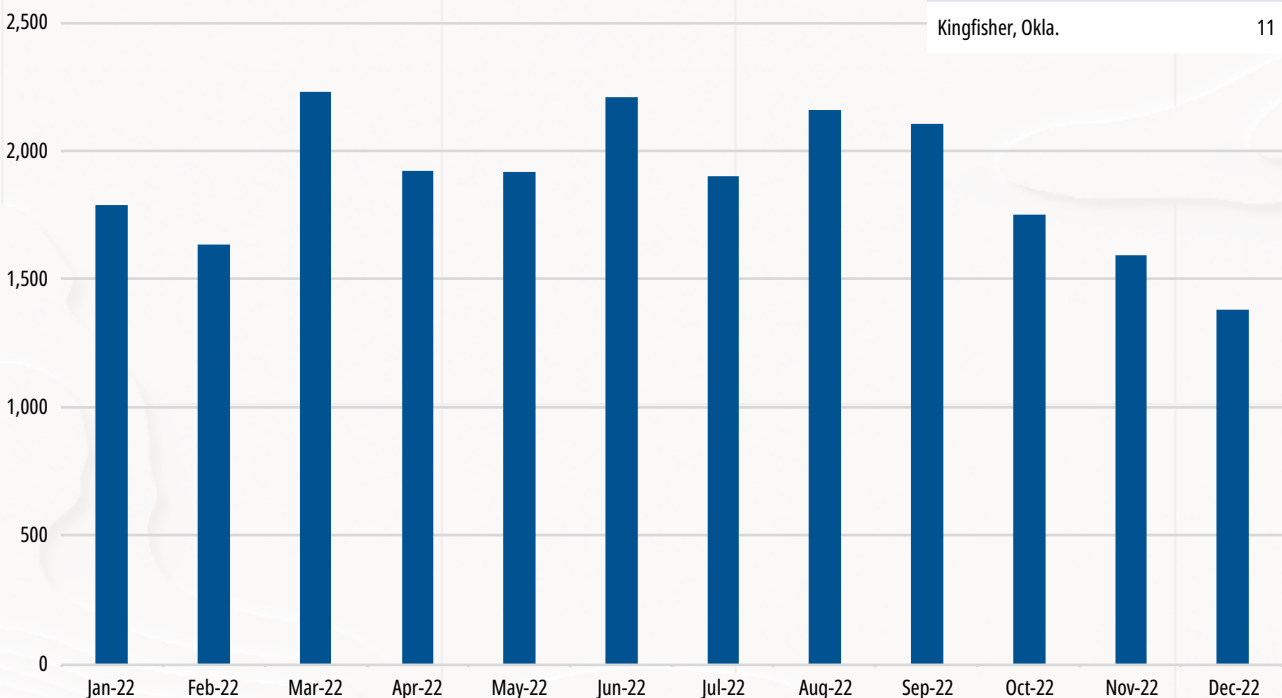
Permitted Wells By Operator

Operator	Well Count
Chevron	105
Caerus	34
Ovintiv	24
Terra	21
BPX Operating	19
Great Western	18
Black Swan Operating	17
Cimarex	17

Permitted Wells By County

County	Well Count
Weld, Colo.	35
Karnes, Texas	30
Reeves, Texas	30
Midland, Texas	26
Andrews, Texas	25
Martin, Texas	25
Culberson, Texas	24
Crane, Texas	23
Williams, N.D.	23
Garfield, Colo.	21
Glasscock, Texas	19
Mountrail, N.D.	19
McKenzie, N.D.	18
Canadian, Okla.	16
Dimmit, Texas	16
Arapahoe, Colo.	14
Garvin, Okla.	14
Dunn, N.D.	11
Kingfisher, Okla.	11

U.S. Well Permits Issued, Monthly



Data from Rextag ENERGY DATALINK

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FOCUS ON: PERMIAN BASIN

The Permian Basin accounts for almost 40% of all U.S. oil production, with technically recoverable reserves in the Delaware Basin alone totaling 46.3 Bbbl.

Pioneer Natural Resources Co., the biggest producer by far in the prolific Permian, plans to produce more in 2023.

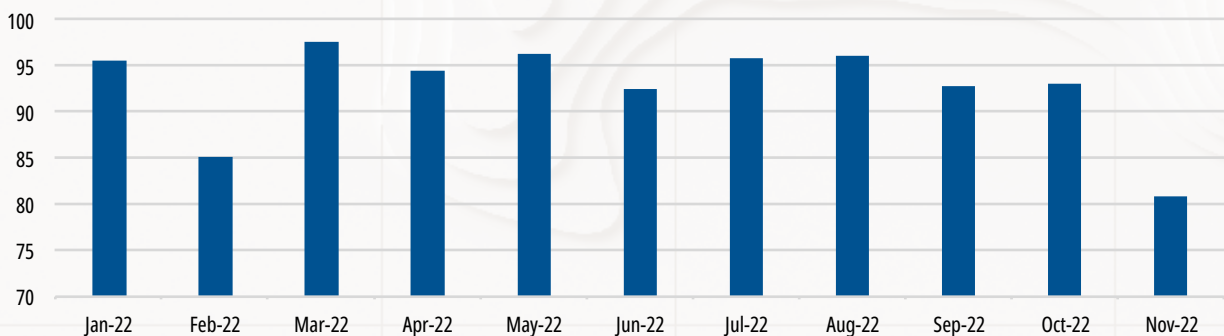
Pioneer's large position in the Midland Basin will enable it to employ 15,000-foot laterals in more than 100 wells this year, the company said in guidance to analysts. In 2023, Pioneer expects its average rig count to be in the 24 to 26 range and its average lateral length to be more than 11,000 feet.

In 2022, Pioneer averaged about 352,000 bbl/d with total production of about 650,000 boe/d. The expectation for 2023 is 357,000 to 372,000 bbl/d of crude and total production of oil, NGL and natural gas of 670,000 to 700,000 boe/d. Capex is estimated at \$4.45 billion to \$4.75 billion.

Diamondback Energy Inc., the Permian's No. 2 producer, also anticipates a bump in output in 2023. Oil production is expected to be 256,000 to 262,000 bbl/d, up from 223,600 bbl/d in 2022. Total production is forecast at 430,000 to 440,000 boe/d, up from 386,000 bbl/d last year. Capex is anticipated to be \$2.5 billion to \$2.7 billion.

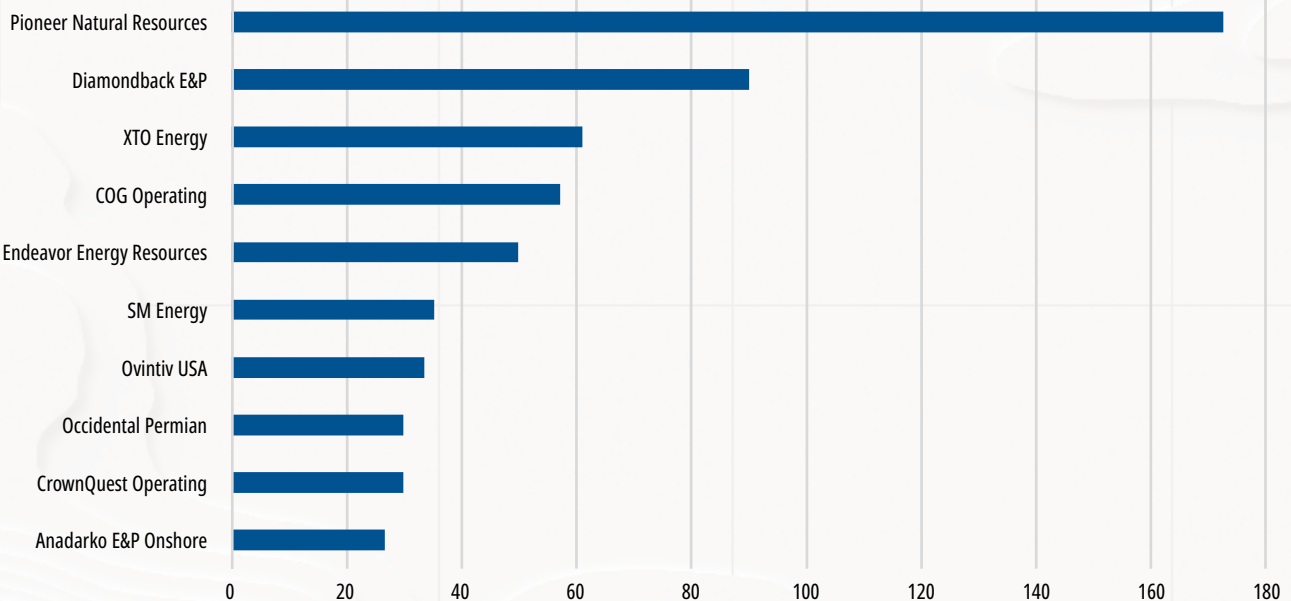
Permian Basin Oil Production

January-November 2022 (MMbbl)



Top Permian Basin Operators

2021, Oil Volume (MMbbl)



Source: Texas Railroad Commission

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2023 SUPER DUG Agenda and Speakers

(Speakers confirmed daily. Visit website for updates.)

DAY 1: May 22, 2023

All the Oil Basins: Devon Energy

Clay Gaspar, Executive Vice President & Chief Operating Officer, Devon Energy Corp.

The Big Bucks: The Money

David Deckelbaum, Managing Director & Senior Analyst, TD Cowen

Tim Perry, Managing Director, Credit Suisse

Bringing It: Diamondback Energy

Danny Wesson, Executive Vice President & Chief Operating Officer, Diamondback Energy Corp.

Buying In: Vencer Energy

Drew Limbacher, Executive Vice President & Chief Operating Officer, Vencer Energy

Bot Deployment: Artificial Intelligence

Sebastian Gass, Chief Technology Officer, Quantum Energy Partners

Sid Misra, Associate Professor, Petroleum Engineering, Texas A&M University

Ali Raza, Chief Digital Officer, ChampionX

Powder River Powder: Anschutz Exploration

Joe DeDominic, CEO, Anschutz Exploration Corp.

A Special Address: Wil VanLoh

Wil VanLoh, Founder & CEO, Quantum Energy Partners

Oil, Gas & Capitol Hill

Steve Pruett, President & CEO, Elevation Resources LLC, and Chairman, IPAA

The Next Inventory: New Plays in the Making

David Deckelbaum, Managing Director & Senior Analyst, TD Cowen

Robert Clarke, Vice President - Upstream Research, Wood Mackenzie

Jay Graham, CEO, Spur Energy Partners

Steve Pruett, President & CEO, Elevation Resources LLC, and Chairman, IPAA

Bakken Since 2005: Enerplus

Wade Hutchings, Senior Vice President & Chief Operating Officer, Enerplus Inc.

DAY 2: May 23, 2023

Big Oil: ConocoPhillips

Kirk Johnson, Senior Vice President, Lower 48 Operations & Assets, ConocoPhillips

Blockchain Btu: The Carbon Option

Sam Holroyd, Chief Commercial Officer, ZeroSix

Permian Go-To: Earthstone Energy

Scott Thelander, Vice President, Earthstone Energy Inc.

The Environmental License: Civitas Resources

Civitas Resources Inc., **speaker TBD**

The Takeaway: The Oil & the Associated Gas

Dr. Ken Medlock, Senior Director, Baker Institute for Energy Studies

Hinds Howard, Portfolio Manager, Infrastructure, CBRE Investment Management

Red Bull: VTX Energy

Gene Shepherd, Founder & CEO, VTX Energy Partners LLC

The Fourth Double Eagle

Cody Campbell, Co-Founder & Co-CEO, Double Eagle IV

SCOOP & Merge: Camino Natural Resources

Seth Urruty, CEO, Camino Natural Resources LLC

Special Session: Chris Wright on Where to From Here

Chris Wright, Chairman & CEO, Liberty Energy Inc.

D&C'ing It & EOR'ing: Liberty Resources

Mark Pearson, CEO, Liberty Resources LLC

EOR & Refracs: EUR-Boosting

Mark Pearson, CEO, Liberty Resources LLC

Bob Barba, President & CEO, Integrated Energy Services Inc.

Multi-Basin: Bayswater

Steve Struna, President & CEO, Bayswater Exploration & Production LLC

DAY 3: May 24, 2023

Tailwinds: Oil Futures: ChampionX Corp.

Saurabh Nitin, Senior Vice President - Emissions Technologies, ChampionX Corp.

OFS Panel: Diminishing Emissions

Saurabh Nitin, Senior Vice President - Emissions Technologies, ChampionX Corp.

Use & Reuse: Water

Duane Germenis, President, Intelligent Water Solutions

John Durand, President and Chief Sustainability Officer, XRI Holdings

At the Pad: Tech Talk

Duane Germenis, President, Intelligent Water Solutions

WORLD-RENOWNED: A SPECIAL GUEST

In this must-attend session, **Hart Energy LIVE** – that has brought to **DUG** special guests like President George W. Bush, General Colin Powell, U.S. Secretary of State Condoleezza Rice and others – will host another executive-level keynote address.

Additional speakers and sessions TBA.

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Chesapeake Sells Oily Eagle Ford Assets to Focus on Natural Gas, LNG

Oklahoma City-based Chesapeake Energy Corp. offloaded nearly \$3 billion of oil-heavy assets in the Eagle Ford Shale to prioritize its positions in the Haynesville and Marcellus gas plays.

As **Chesapeake Energy Corp.** adjusts its portfolio to become a pure-play natural gas producer, the company needed to offload oily assets in the Eagle Ford Shale.

The Oklahoma City-based shale independent said it viewed its Eagle Ford assets as noncore to the company's future capital allocation strategy last summer. Instead, Chesapeake turned its attention to focus on the company's gassier positions in the Haynesville and Marcellus basins.

"While the Eagle Ford is a strong asset, as we look to the future, it simply does not compete today with the exceptional returns, rock and runway of our gas assets," said Nick Dell'Osso, president and CEO at Chesapeake, in the company's second-quarter earnings call last August.

During the first quarter of 2023, Chesapeake lined up two deals totaling nearly \$3 billion to sell a substantial portion of its Eagle Ford position.

Brazos Valley deal

In the first deal, announced Jan. 18, Chesapeake agreed to sell its assets in the Brazos Valley region of the Eagle Ford to **WildFire Energy I LLC** for \$1.425 billion.

The deal included approximately 377,000 net acres and 1,350 wells, along with related property, plant and equipment. The Brazos Valley assets had average net daily production of around 27,700 boe during the third quarter of 2022.

Chesapeake purchased around 420,000 net acres from **WildHorse Resource Development Corp.** for nearly \$4 billion in 2019. In somewhat of a twist, WildFire is led by some former WildHorse executives—including CEO Anthony Bahr, the former president of WildHorse.

Andrew Dittmar, director at **Enverus Intelligence Research**, said the terms of Chesapeake's sale to WildFire were a bit underwhelming, considering Chesapeake paid almost \$4 billion in the WildHorse acquisition that brought the Brazos Valley assets into the company's portfolio.

The deal's purchase price of \$1.425 billion also appeared to be "a bit beneath the value of the production with no value attributed to the undrilled locations,"



"While the Eagle Ford is a strong asset, as we look to the future, it simply does not compete today with the exceptional returns, rock and runway of our gas assets."

—Nick Dell'Osso, *Chesapeake Energy Corp.*

Dittmar said when the deal was announced.

For WildFire, the Chesapeake deal adds acreage in Burtleson, Brazos, Robertson, Madison, Lee, Washington and Grimes counties, Texas.

Black oil deal

About a month after unveiling its Brazos Valley deal with WildFire, Chesapeake announced reaching a second deal to sell a piece of its Eagle Ford position on Feb. 21.

Chesapeake agreed to sell its assets in the black oil window of the South Texas shale play to **INEOS Energy** for \$1.4 billion.

The deal with **INEOS Energy**, a subsidiary of U.K.-based chemical company INEOS Group, includes approximately 172,000 net acres and 2,300 wells in Dimmit, LaSalle and McMullen counties, Texas. The asset had average net production of around 36,000 boe/d during fourth-quarter 2022, Chesapeake said.

The transaction, expected to close during second-quarter 2023, will mark INEOS Energy's first entrance into the U.S. oil and gas production space.

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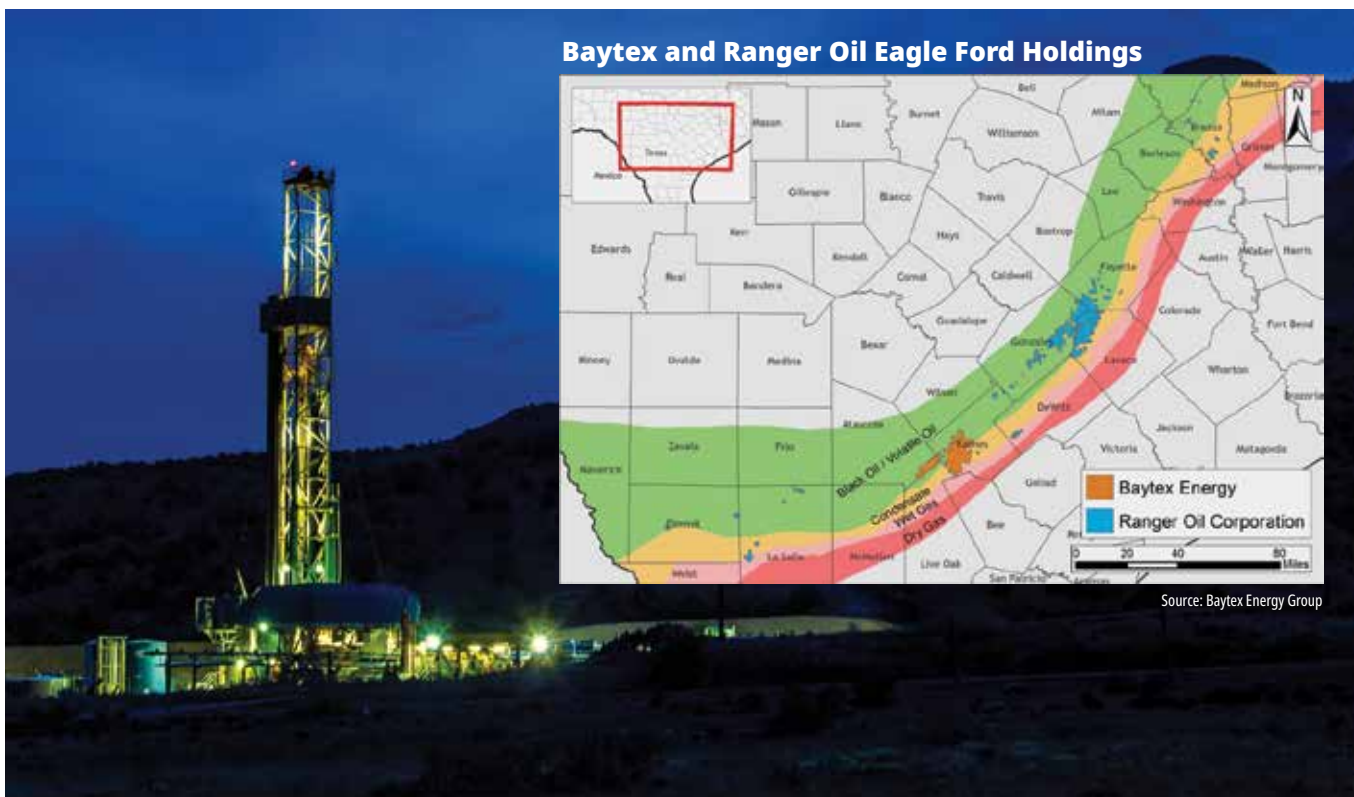
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Baytex to Acquire Eagle Ford E&P Ranger Oil for \$2.5 billion

Baytex Energy Group has entered into a definitive agreement to acquire Eagle Ford E&P **Ranger Oil Corp.** for about \$2.5 billion in cash and stock, including the assumption of debt, the companies said Feb. 28.

The deal is the latest Eagle Ford transaction following months of multibillion-dollar M&A by **Marathon Oil Co.**, **Devon Energy Corp.** and, most recently, **Chesapeake Energy Corp.**

Under the terms of the agreement, Ranger shareholders will receive a fixed ratio of 7.49 shares of Canada's Baytex and \$13.31 in cash for each Ranger share. Upon closing, Baytex shareholders would own approximately 63% of the combined company and Ranger shareholders would own approximately 37%.

The transactions are expected to close in the second quarter of 2023.

Eric T. Greager, president and CEO of Baytex, called the Ranger acquisition "strategic" and said it would more than double the company's EBITDA and nearly double its free cash flow.

Ranger Oil's inventory competes for capital within Baytex's portfolio and offers the potential for up to 15 years of oil-weighted drilling locations.

Ranger Oil's assets additionally add Eagle Ford scale for Baytex, which has a nonoperated position in the Karnes Trough.

The transaction includes 162,000 net acres in the crude oil window of the Eagle Ford Shale, highly concentrated in Gonzales, Lavaca, Fayette and Dewitt counties, Texas. Baytex said

the deal adds 67,000 boe/d to 70,000 boe/d (72% light oil, 15% NGL and 13% natural gas).

The transaction also augments the company's proved reserves, which will also increase by 174 MMBoe.

"We are acquiring a strong operating capability in the Eagle Ford, on trend with our nonoperated position in the Karnes Trough and driving meaningful per-share accretion on all metrics," Greager said. "We are building quality scale and a more durable business with a lower breakeven WTI price."

Darrin Henke, president and CEO of Ranger, said he expects that "combining with the balance sheet strength, deep asset base, and operational excellence of Baytex will create a unique company of scale which will deliver sustained free cash flow growth and differentiated shareholder returns.

"We look forward to bringing together our complementary teams and assets to realize the long-term value of this combination for our shareholders," he said.

CIBC Capital Markets and **RBC Capital Markets** are acting as financial advisers to Baytex. **Scotiabank** is acting as strategic adviser to Baytex. **Vinson & Elkins LLP** and **Burnet, Duckworth & Palmer LLP** are serving as Baytex's legal counsel.

BofA Securities Inc. and **Wells Fargo Securities LLC** are acting as financial advisers to Ranger. **Kirkland & Ellis LLP** is serving as Ranger's legal counsel, and **Stikeman Elliott LLP** is serving as Ranger's Canadian legal counsel.

—Darren Barbee

Riley Exploration Permian Grows New Mexico Footprint with \$330 Million Deal

Oklahoma City-based **Riley Exploration Permian Inc.** is expanding its footprint into new parts of New Mexico.

Riley Permian agreed to pay \$330 million in cash to acquire oil and gas assets in New Mexico from **Pecos Oil & Gas LLC**, an affiliate of **Cibolo Energy Partners LLC**, the companies announced Feb. 28.

The deal adds 11,700 contiguous net acres in Eddy County, N.M., with current production of 4,200 bbl/d (7,200 boe/d) to Riley Permian's portfolio. The transaction also tacks on more than 100 gross horizontal development drilling locations to Riley Permian's oil-weighted portfolio, Riley Permian said.

In addition to oil and gas assets, the deal grants Riley Permian 100% ownership of associated water gathering and disposal infrastructure, including about 70 miles of water gathering pipelines.

"This is an underdeveloped asset with extensive development potential, allowing for value creation potential through the drill bit," said Bobby Riley, chairman and CEO of Riley Permian, in a Feb. 28 statement. "Our enhanced scale will improve our cost structure, will facilitate normalizing development cadence and may lead to oilfield service cost savings."

Riley Permian said Pecos Oil & Gas' asset, located within New Mexico's Yeso Formation, has geological similarities to Riley's existing core asset in the San Andres Formation in Yoakum County, Texas. The company also has acreage in Lea and Roosevelt counties, New Mexico.

Riley Permian expects drilling and completion costs in the



Source: Riley Permian

Yeso Trend will be lower overall for shallower, conventional source rock compared to deeper shale wells, allowing the New Mexico asset to compete on drilling economics with the company's core asset.

Riley Permian said the transaction is valued at 3.4x 2023

adjusted EBITDAX and a 15% free cash flow (FCF) yield, accretive relative to Riley Permian's 2023 stand-alone metrics.

Riley Permian plans to finance the acquisition using borrowings under the company's revolving credit facility and proceeds from issuing new senior debt. Riley Permian plans to issue \$200 million of senior unsecured notes upon closing the deal, which is expected to occur during the second quarter.

On a combined basis, the transaction is forecasted to increase Riley Permian's adjusted EBITDAX by about 50% and FCF by about

70% in 2023.

The E&P reported average oil production of 9,400 bbl/d during third-quarter 2022 (12,700 boe/d), according to the company's most recent quarterly earnings report. The company anticipated that oil production in the fourth quarter would average between 9,400 bbl/d and 9,900 bbl/d.

Riley Exploration Permian went public through a reverse merger with the Colorado-based Tengasco Inc. in an all-stock deal in February 2021.

The company's predecessor, private equity-backed Riley Permian, was formed with the goal of building a premier Permian Basin pure-play business.

—Chris Mathews

Carrier Energy Partners Divests Eagle Ford Assets For \$145 Million

Carrier Energy Partners II LLC has closed a sale of its nonoperated working interests in the Eagle Ford Shale, marking a full exit from the play and a divestiture of its remaining assets.

Carrier Energy sold its nonoperated working interests in Karnes County, Texas, to an undisclosed buyer in two transactions totaling cash consideration of \$145 million, including closing adjustments.

The Eagle Ford transactions represent a full divestiture of the company's existing assets. The company previously sold assets in the Permian Basin in 2017 and 2019.

Although minor compared to recent M&A in the shale play, the deal continues a broader trend of transactions in the Eagle Ford, including **Baytex Energy Group's** Feb. 28 announcement that it would buy **Ranger Oil Corp.** for about

\$2.5 billion in cash and stock.

Chesapeake Energy has also announced two Eagle Ford divestitures this year: a \$1.425 billion deal to sell its Brazos Valley assets to **Wildfire Energy I LLC** and, more recently, \$1.4 billion deal with **INEOS Energy**. In 2022, **Marathon Oil Corp.** and **Devon Energy Corp.** also made deals totaling \$4.8 billion.

Carrier Energy was founded in 2013 by Mark Clemans and Christina Chen with equity funding from **Riverstone Holdings**, an asset management firm that invests in the private markets primarily within energy, power and infrastructure.

Carrier Energy initially participated in two joint ventures targeting development of oil and gas assets in the Delaware Basin and in a legacy conventional field located in South Texas.

—Hart Energy Staff

► TRANSACTION HIGHLIGHTS

TEXAS

Principal Solar Inc. said on March 15 that it has signed an agreement to purchase a controlling working interest in oil and gas leases, wells and associated assets in the more than century-old Minerva-Rockdale oil field in Milam County, Texas.

Principal Solar said it would purchase the Navarro A & B formations assets from San Antonio's **Winchester Oil & Gas LLC** for an undisclosed sum.

Principal Solar said it signed a letter of intent to acquire approximately 11,000 gross acres and 936 total production and disposal wells. The purchased assets include 657 pump jacks, 48 tank batteries and 2.3 miles of pipeline.

Minerva-Rockdale Field was discovered in 1921 and was once one of the largest oil fields in Texas, according to Principal Solar. Total production from August 2014 to today stands at 481,000 bbl.

MIDCONTINENT

Foothills Exploration Inc. has added 545 wells to its oil and gas inventory with the closing of its **Jubilee Exploration LLC** acquisition in January, the company announced in a Feb. 24 press release. The financial terms of the deal were not disclosed.

Anaconda Energy, a Foothills subsidiary, acquired 100% membership interest in Jubilee Exploration, an independent oil and gas producer with shut-in or stranded oil and gas wells across multiple leases in Oklahoma and Kansas. Jubilee Exploration is now an indirect subsidiary of Foothills.

The acquisition's existing infrastructure allows Foothills to grow in production, reserves and revenues in 2023 and 2024 with low-cost development opportunities, the company said.

"Our natural gas-focused strategy is based on having economical, long-lived reserve assets in established basins to serve a growing nationwide demand for clean, affordable and abundant natural gas," said Kevin J. Sylla, executive chairman of Foothills. "This acquisition enhances our well inventory and overall position in the U.S. Midcontinent and is complementary to our current footprint."

Foothills said it will immediately begin gas production at 139 well sites in Oklahoma's Craig and Nowata counties. The wells are expected to deliver average production of 1.5 MMcf/d to 2.5 MMcf/d by reconnecting wellheads, maintaining facilities and repairing electrical and flowlines. Natural gas production from all

acquired wells is expected to increase to approximately 5 MMcf/d to 8 MMcf/d within their first two years of production, according to the press release.

The company also plans to return 14 wells in Jackson and Garvin to production. Foothills said it anticipates combined production to average 30 bbl/d to 40 bbl/d. Garvin County includes three DUCs that are currently in litigation.

GULF COAST

Enbridge is acquiring a natural gas storage facility in a deal with **Crestwood Equity Partners LP** and **Brookfield Infrastructure Partners**.

The Calgary-based midstream company is purchasing the Tres Palacios gas storage facility in Matagorda County, Texas, for \$335 million, Enbridge announced on March 1.

Tres Palacios is a salt cavern natural gas storage facility located in Markham, Texas, with a working gas capacity of around 35 Bcf across three storage caverns. A fourth storage cavern working its way through Federal Energy Regulatory Commission permitting would add another 6.5 Bcf of capacity.

The facility has a maximum injection rate of 1 Bcf/d and a maximum withdrawal rate of 2.5 Bcf/d, according to regulatory filings.

Tres Palacios also owns a 62-mile gas header pipeline system that interconnects with 11 major gas pipeline connections, including with Enbridge's Texas Eastern Pipeline.

The transaction is expected to close during the second quarter.

Bayou Bend CCS LLC announced a major expansion on March 6 that more than quadrupled the CO₂ storage capacity of the Texas Gulf Coast project to more than 1 billion metric tonnes.

The carbon capture and storage joint venture of **Chevron U.S.A. Inc.**, **Talos Energy Inc.** and **Carbonvert Inc.** said it purchased more than 100,000 acres onshore in Chambers and Jefferson counties, Texas. In combination with Bayou Bend's previously announced 40,000 acres offshore Beaumont and Port Arthur, Texas, the expanded Bayou Bend project now encompasses nearly 140,000 acres of pore space for permanent CO₂ sequestration.

The total acreage positions Bayou Bend to be a leading carbon transportation and storage player for industrial emitters in the Houston Ship Channel and Beaumont/Port Arthur region, one of the largest

industrial corridors in the country, the company said.

EUROPE

Equinor ASA has acquired 5 million shares in renewable energy firm **Scatec ASA** from **Scatec Innovation AS**, a stake of about 3.1% of the company's shares and votes for about US\$28 million (NOK 305 million).

Following the transaction, Equinor now owns about 25.7 million shares of Scatec, raising its total shareholding to 16.2% of the shares and votes, Equinor said in a March 16 press release. The purchase price per share was NOK 61.

"As the largest shareholder in the company, we have acted on this opportunity to acquire an additional 3.1% stake in Scatec, a leading renewable energy company in emerging economies. The acquisition aligns well with our disciplined approach to growth within renewables. Since Equinor acquired its first shares in Scatec in 2018, we have continued to work constructively with Scatec's management," said Pål Eitheim, executive vice president for renewables at Equinor.

Partnering with Scatec, Equinor entered its first solar development project in 2017 via the Apodi asset in Brazil, followed by a second joint project in June 2018 with the Guanizul 2A in Argentina. The two companies are also partners with **Hydro Rein** in the Mendubim solar development project (531 megawatts) in Brazil.

NORTH SEA

Suncor Energy received a better-than-expected deal from Equinor after the Norwegian company agreed March 3 to acquire the Canadian company's U.K. business unit, analysts said.

Equinor agreed to pay \$850 million to the British business, which will add to the stakes Equinor has in several key North Sea offshore projects.

Equinor said the deal includes a 29.9% stake in the Buzzard oilfield, an additional 40% stake in the Rosebank development and will also see the Norwegian firm taking on Suncor's U.K.-based employees who work with these assets.

Tudor, Pickering, Holt & Co. analysts viewed the deal as a positive for Suncor. Part of Equinor's deal includes a \$250 million (CA\$340 million) contingency payment based on the submission of a Rosebank development plan.

The deal, expected to close in mid-2023, also supports Suncor's move to



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accelerate reduction of final net debt and shareholder returns targets (CAS9 billion and 100% of free cash flow) following a step up to the 75% of free cash flow level at the end of the quarter.

The transaction will add approximately 15,000 boe/d to Equinor's production in 2023, the Norwegian company said.

Equinor is already the operator of the planned offshore Rosebank oil and gas project, some 130 km (80 miles) northwest of the Shetland Islands and one of the largest developments in the aging North Sea basin.

The deal doubles Equinor's stake in the development to 80%, while London-listed **Ithaca Energy** holds the remaining 20%.

NORTH AMERICA

EIG Global Energy Partners' subsidiary **Breakwater Energy** has acquired a 25% interest in Repsol's E&P global upstream oil and gas business **Repsol Upstream** for \$4.8 billion, EIG announced in a March 2 press release.

Repsol Upstream is a newly-formed, gas-weighted E&P, which owns and operates Repsol's global upstream assets totaling more than 600,000 boe/d of production in 15 countries, including in

the U.S. Repsol's business unit operates in the Marcellus Shale, Alaska's North Slope, the Gulf of Mexico and, since 2020, the Eagle Ford Shale, according to its website.

EIG, an institutional investor, said the portfolio maintains a low-carbon intensity and generates free cash flow to support a meaningful dividend. Repsol still owns 75%.

Repsol and EIG plan to list the business in the U.S. starting in 2026, subject to favorable market conditions.

EIG will have the right to nominate two directors to Repsol Upstream's board, four more will be nominated by Repsol and two directors will be independent for a total of eight directors. EIG will also choose Repsol Upstream's ESG director and another senior executive to lead special projects, including IPO preparation.

Goldman Sachs & Co LLC and **J.P. Morgan** financially advised EIG with the transaction. Goldman Sachs, J.P. Morgan and **Lazard** acted as capital markets advisors for the transaction's financing. **Latham & Watkins** and **Debevoise & Plimpton** served as legal advisers to EIG.

GOM

NGL Energy Partners LP announced the signing of two definitive agreements to sell its marine assets for a total of \$111.65 million cash, the company said in a March 6 press release.

The buyer of the assets wasn't disclosed.

The company's marine fleet consists of 13 towboats and 25 tank barges. The midstream MLP's fleet provided waterborne transportation of refined products and crude oil for a diversified group of customers, including major oil refineries on the Gulf Coast. The transaction is expected to close at the end of this month, subject to customary closing conditions.

"This noncore asset sale should allow NGL to further reduce leverage by March 31, 2023, as these proceeds will be used for debt reduction," said NGL CEO Mike Krimbill. "Our near-term focus continues to be reducing absolute debt and leverage."

BofA Securities, Inc. is serving as NGL's financial adviser and **McAfee & Taft** of Tulsa, Okla., is serving as NGL's outside legal counsel.

UKRAINE WAR'S LESSON: ENERGY SECURITY BEGINS AT HOME

A year after Russia's invasion of Ukraine, the importance of energy security remains a key lesson, expert says.

 **JOSEPH MARKMAN**
SENIOR EDITOR,
MARKETS & DATA

 @JHMarkman

 jmarkman@hartenergy.com

His invasion of Ukraine one year ago may not have gone in the direction Russian President Vladimir Putin intended, but it definitely altered the trajectory of the global energy transition, an expert in the geopolitics of European natural gas told Hart Energy.

"It has changed because energy security as a matter of consideration is in the front of everybody's mind," said Anna Mikulska, a fellow in energy studies at Rice University's Baker Institute for Public Policy.

And it probably changed the attitude of countries that had seen the execution of the energy transition as a mission unto itself and not contemplated the need to partner it with energy security.

That realization stemmed from Putin's weaponization of natural gas against opponents of the Feb. 24, 2022, invasion.

Cutting off the flow of gas to European customers may have come as a shock to countries like Germany and France. As those countries led the EU's decarbonization efforts, they were convinced that Russia would continue to deliver energy resources to western markets, Mikulska testified to the Senate Committee on Energy and Natural Resources on Feb. 16.

The cutoff didn't surprise Mikulska, though, nor did Europe's forceful response in replacing Russian gas with expensive LNG, as well as increased mining of coal, to generate electricity. To some extent, the infrastructure was already in place. For example, Germany was able to incorporate floating LNG facilities within months of the invasion.

"These LNG terminals have been planned for a while," she said. "It's just that the system was never made to go to the next stage. A lot of infrastructure, in particular pipeline infrastructure, was there, and the connection to the floating terminals was much easier than it would have been anywhere else in the world."

That's because Europe could afford it.

The advantage of wealth

In the wake of the Ukraine war, the global rift between the haves and have-nots has become more pronounced. Western Europe possessed the wealth to compensate for the reduction of Russian gas. Others, Mikulska

said, were literally left out in the cold this winter.

In Pakistan, for example, imported LNG accounted for about 25% of the gas used for power generation, factories and home cooking prior to the war, according to BP. After the war began, however, the European benchmark price of gas soared and those shipments were diverted to western European customers better able to afford them.

Pakistan began rationing fuel, and coal and nuclear plants were shut down on a limited basis. In late January, plants failed to restart and the country endured a nationwide blackout. Now, its policy has changed to move away from LNG and quadruple domestic coal production.

U.S. LNG terminals more than doubled their volumes sold to Europe to 2.7 Tcf in 2022, helping the EU replace 80% of pipelined Russian natural gas. But it wasn't enough, and more coal was needed to be burned to close the gap, a development not lost on the leaders of emerging economies.

"Aiming to reduce their dependence on Russian crude oil and natural gas, countries in Europe had to switch to coal to keep their homes warm and well-lit," according to an Indian budget document. "The behavior of European nations in 2022, eminently understandable, demonstrates the return of energy security as a prime requirement for countries. Therefore, it stands to reason that it would be no different for developing economies too."

Surveys of Asian populations before the Russian invasion of Ukraine revealed that economic growth and employment topped the list of concerns, not environmental threats or climate change, Mikulska said.

"The developing world has been saying all along: In order to develop, to reach the structure of development that Europe or the U.S. or Australia are at, we actually need reliable energy sources. And a lot of it," she said. "Energy security has been one of the major issues for both the government and the population."

The rift has been there all along, Mikulska said. "I think it wasn't sinking in until the invasion happened and Europe had to turn back to the idea of energy security."



“The developing world has been saying all along: In order to develop, to reach the structure of development that Europe or the U.S. or Australia are at, we actually need reliable energy sources. And a lot of it.”

—Anna Mikulska, Rice University’s Baker Institute for Public Policy

Fossil fuels remain dominant

Europe caught a break with a surprisingly mild winter, giving it some breathing room to contemplate its next steps, she said.

For now, the plan is simple: “You don’t want your population to starve. You don’t want your population to be

cold, and so Europe came to all-of-the-above.”

Those kinds of steps, even increased mining of lignite coal in Germany, are acceptable to Europeans as long as they are understood as emergency measures.


Politically, it makes sense to say it’s short term because the public in Europe has been conditioned to see the energy transition as necessary, unavoidable and something to be desired, Mikulska said. “So, politically, saying ... we don’t know how long, would not be actually something that would be popular.”

Europe has spent a lot of money on many fronts of the energy transition, including new infrastructure for gas, renewables and hydrogen, trying to create new markets or sources of supply. It’s money that most countries in the world don’t have, and it’s only achieved so much to this point.

“Truly, none of the alternative solutions can pick up the entire slack from traditional fuels like gas and coal,” she said.

For countries without the financial resources to invest in new, as yet unproven sources of energy, the solution is simple: Invest in what you have.

“If something is developed domestically, it’s the most secure source of energy,” Mikulska said.

It’s why Pakistan, India and Indonesia turned to coal when the price of natural gas skyrocketed. The lesson of the war in Ukraine has underscored what has been true all along: Energy security is important. 

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OPEC CHIEF: EU'S SEVERING DEPENDENCE ON RUSSIA IS 'TYPICAL' MARKET REDIRECTION

As worldwide oil and gas flows have been altered due to Russia's invasion of Ukraine, OPEC Secretary General Haitham Al Ghaiss said a slowdown in the U.S. and Europe "concerns us more."

 **DEON DAUGHERTY**

EDITOR-IN-CHIEF

 @Deon_Daugherty

 ddaugherty@hartenergy.com

The global market flow of energy imports and exports is always in flux, and so the disruption to EU energy supplies following Russia's invasion of Ukraine "is not something that really concerns us," said OPEC Secretary General Haitham Al Ghaiss.

Other international players view it differently. Indeed, many see challenges ahead given "the reality of a war going on at the center of Europe," said Carlos Pascual, S&P Global Commodity Insights' senior vice president for geopolitics and international affairs.

The pair discussed the role of OPEC, the relevance of OPEC+ and the reality of the energy "transitions" during a conference spotlight conversation on March 7 during CERAWEEK by S&P Global in Houston.

A service organization

OPEC itself operates akin to a "mini" U.N., Al Ghaiss said. His team of more than 140 represents the cartel's member nations and 42 nationalities, all working to "promote global market stability" and fulfill the vision established in 1960 by its five founding member countries, he said.

"We always say that the oil that's in our countries under the ground belongs to us, but it actually belongs to you. All of you. All around the world. It belongs to mankind, to humanity," he said.

Al Ghaiss said OPEC wants to promote the idea that the cartel preserves its reservoirs via best practices and uses the best technologies to promote the use of oil in a sustainable and environmentally friendly way.

That philosophy was the genesis of OPEC+ during the 2016 downturn, which dictated an agreement among OPEC members and others, including Russia, which was then termed a "Declaration of Cooperation."

"We all remember April 2020, when WTI prices were negative and the market collapsed due to the pandemic," he said. "[OPEC+] stepped in again with humongous production adjustments on nearly 10 million barrels a day, which I would say really actually saved the industry from collapse."

Al Ghaiss said his vision for OPEC's role is "something of service to the oil industry" that

includes action to preserve an investment friendly climate and a stable market with less volatility.

How would the world carry on without OPEC+?

Pascual attempted to steer the talk toward the current "tensions in Europe" and the incumbent relevance of OPEC+.

"The tensions within Europe right now are palpable. Within that context, does OPEC+ remain viable?"

Al Ghaiss redirected.

"Let's turn it around to another question, which I would say is, 'How would the world or our industry be without OPEC+?'"

"Stop and think and reflect about that. I think the image that would come to mind is something of instability, more volatility. I don't think that's something that's in the interest of producers or consumers or the global economy, and definitely not in the interest of the oil and gas industry. So I think, yes, OPEC+ is critical."

Al Ghaiss followed up to "remind everybody" that when the OPEC+ agreement was formed in 2016, few expected the relationship to last.

"We are going strong into our seventh year working together to try and promote stability. So I think it's become sort of a transparent mechanism and methodology where everybody knows where we meet, what we discuss, when we meet," he said.

Al Ghaiss pointed to the group routinely holding a press conference following its meetings to explain its decisions.

"I think it's critical, and it's important to have OPEC+," he said.

'Typical redirection'

Neither speaker addressed whether OPEC+ can remain effective given the general condemnation of Russia's war on Ukraine and its subsequent weaponization of energy, which has profoundly shaken most of Europe.

"It will certainly be one of those issues that remain a challenge for the international community. I think it's inevitable that it will be because of the extraordinary nature of what's happened to the center of Europe and the reality of a war going on at the center of Europe," Al Ghaiss said. "So let's see what happens."



CERAWeek by S&P Global

“We all remember April 2020, when WTI prices were negative and the market collapsed due to the pandemic. [OPEC+] stepped in again with humongous production adjustments on nearly 10 million barrels a day, which I would say really actually saved the industry from collapse.”

—Haitham Al Ghais, OPEC Secretary General

What’s happened so far: Europe no longer relies on Russia for the lion’s share of its energy needs.

Pascual said much of Russia’s crude exports are going to China and India, while the Middle East has increased its exports to Europe.

Is that market “switch”—an upending of decades’ worth of continental energy policy and practice—cause for concern? Or, Pascual asked, is it a positive outcome for OPEC?

Al Ghais said OPEC wasn’t really concerned.

“The markets—at least in my 30 years or so of doing this business—[there] have always seen redirection of flows, whether it’s related to geopolitical events or demand centers being created, others disappearing,” Al Ghais said. “This is typical where we have a redirection and flows from the east to the west or the west to the east.”

EU leadership views shift differently

Russian President Vladimir Putin’s invasion of Ukraine in February 2022 forced European countries to abandon their high level of dependence on Russia for oil and natural gas. In 2021, Russia was the largest provider of petroleum to the EU with a 25% share; Russia supplied almost half of its natural gas.

The EU’s import of Russian resources has dropped sharply following sanctions and price caps imposed last fall, and other penalties remain on the table.

Before the war, Russia supplied 39% of the EU’s natural gas. That figure is now just 9%.

“The measures that are being taken now are, in many ways, irreversible,” Paula Pinho, director at the European Commission’s Directorate-General Energy, said during a separate March 7 presentation at CERAWeek. “Even if you see in the future—and we do hope so—a fundamental political change in Russia, there are issues that took place over the past year that cannot be reversed so easily.”

U.S. finances trouble OPEC

More than burgeoning concern over the EU market disruption, Al Ghais said financial matters in the U.S. are of greater interest.

“What concerns us more is actually the slowdown we see in Europe and the U.S. financial situation and inflation,” he said. “We see a kind of a divided market and almost like two markets: one market with promising growth and the other side with a slowdown.”


In short, the “redirection” of the European market supply is “not really a concern,” Al Ghais said.

“It’s quite normal to see this bounce,” he said. “I mean, let’s remind ourselves that it was expectations in the beginning of the year that Russian crude production would drop by 3 million barrels a day. But Russian production has been resilient and it’s managed to find a new home. It’s not just in ... China, and I think also in Turkey.”

Pascual said China and India are paying for commodities at a significant discount to the rest of the world.

“Indeed, one of the factors is obviously there has been a bifurcation in the market in terms of price,” he said. “The revenue flows ... that’s a little bit of [whether there is a] benefit or not to the countries of the Middle East [who] have had that opportunity to actually redirect their supplies to, frankly higher prices.”

Al Ghais said that the market is dictated by what buyers are willing to pay.

“OPEC does not get involved in pricing or prices,” he said. “Our NOCs [national oil companies] set their prices on a monthly basis, but this has no relation to OPEC itself or what we do. It’s all supply-demand driven. If there is a demand for oil ... and NOCs can afford to apply a higher premium ... and the market’s willing to accept that, that’s what will happen.” 



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EUROPE WON'T BE DEPENDENT ON RUSSIAN OIL AND GAS AGAIN

The invasion of Ukraine convinced Europe to shift away from Russian oil and gas, energy officials say.

JOSEPH MARKMAN
SENIOR EDITOR,
MARKETS & DATA
@JHMarkman
jmarkman@hartenergy.com

Russian President Vladimir Putin may have succeeded where global policymakers failed: speeding up the transition away from fossil fuels.

"I have no doubts that, as far as the EU is concerned, what happened over the past year accelerates the energy transition immensely, and that is the irony—that it's a clear achievement by Putin," said Paula Pinho, director at the European Commission's Directorate-General Energy, at CERAWEEK by S&P Global. "He is managing to accelerate the energy transition in Europe in ways that we could not have imagined until one year ago."

Putin's invasion of Ukraine in February 2022 forced European countries to abandon their high level of dependence on Russia for oil and natural gas. Before the war, Russia supplied 41% of the EU's natural gas. That figure is now just 9%.

"The measures that are being taken now are, in many ways, irreversible," said Pinho, who is responsible for energy efficiency and transition, consumers, innovation and energy security. "Even if you see in the future—and we do hope so—a fundamental political change in Russia, there are issues that took place over the past year that cannot be reversed so easily."

Among them, the rapid deployment of floating storage regasification units to handle the massive volumes of LNG shipped by U.S. exporters, as well as the unity demonstrated by the EU's 27 countries.

Capital flow

The commitment to the energy transition is certainly greater than before, said Michael LaMotte, senior managing director at Guggenheim Securities. But that does not eliminate the supply chain and regulatory issues that can still hinder progress.

A key difference in the past year is that policymakers were forced to pay attention to the energy transition, which can help capital flow to where it is needed, particularly to emerging economies.

To make the financial aspect function, credit committees in the U.S. and Europe need to reevaluate how they assess risk so that all of the money available to go to work can actually go to work, LaMotte said.

"We have a huge opportunity to leapfrog and accelerate the transition by bringing



"The measures that are being taken now are, in many ways, irreversible."

—Paula Pinho, European Commission's Directorate-General Energy



"As long as Putin is in power ... access to capital is going to be tight."


—Michael LaMotte, Guggenheim Securities

the developing world faster into renewables and alternatives, rather than bringing them up through the coal and wood, and oil and gas progression that we did in the U.S. and Europe," he said. "One of our hopes is that we can actually address this through the World Bank and the other global sources of funds. We can actually manage that cost of capital and get it deployed and bring these economies along through the transition faster."

In that sense, the potential exists for emerging economies to have an advantage over Russia.

"As long as Putin is in power ... access to capital is going to be tight," LaMotte said.

Access to western capital is just one dilemma for Russia. Another is the loss of western technical capacity.

"The IOCs [international oil companies] that ripped thousands of people out of Russia," said Richard G. Newell, president and CEO of Resources for the Future and former U.S. EPA administrator. "How fast are they going to go back?" 

CAN GOVERNMENTS, OIL AND GAS PLAYERS BE PERMITTED TO GET ALONG?

Governmental measures at the start of the Ukraine war to stabilize oil and gas markets did not ease distrust from the industry.

 **JOSEPH MARKMAN**
SENIOR EDITOR,
MARKETS & DATA
 @JHMarkman
 jmarkman@hartenergy.com

Massive government intervention to control the price of oil and gas ... who's in favor?

A majority of the crowd gathered for CERAWEEK by S&P Global would likely have given a visceral negative response, given the tenor of discussions concerning regulations. But what if the question was more nuanced: Are markets better off as a result of multiple governments joining to limit Russian revenues from oil and gas sales, as well as keeping prices low in the wake of the Ukraine war?

That was asked by Carlos Pascual of S&P Global Commodity Insights, moderator of a session on the growing role of government at CERAWEEK by S&P Global. Few hands went up in the audience.

Panelists showed little surprise, but neither did they back down.

Indeed, the distrust of government policies was so intense at the CERAWEEK government session that oil and gas industry representatives were loath to say they approved of actions taken to stabilize global markets, even if they benefited from those actions. It was a sentiment that echoed throughout the Hilton-Americas during CERAWEEK this year.

"It's always hard to compare to the counterfactual. What would have happened in the world if not for this?" said Richard G. Newell, president and CEO of Resources for the Future and a past administrator of the Environmental Protection Agency.

The oil market operates in a just-in-time manner, added Michael LaMotte, senior managing director of Guggenheim Securities. There's not a lot of flexibility in the system, so friction causes significant price volatility.

"Markets don't deal with externalities particularly well, so the invasion of Ukraine was a shock," LaMotte said. "But I think the policy response helped relieve Europe."

Two aspects of government intervention helped: reduction of uncertainty in the oil markets, in particular; and giving the market and market participants guidance on how to continue to trade and transact so the system can work with as little friction as possible,

given the circumstances.

"Immediately after the invasion, with the runup in crude prices, I think the markets' certain collective conclusion was, we're headed towards a ban, most likely similar to that with Iranian crude," LaMotte said. "This Russian oil would just be off the market. And with economies recovering post-COVID, there was a lot of concern about the supply-and-demand imbalance, which triggered the release of the SPR [Strategic Petroleum Reserve] and other constructive policy responses in terms of bringing the price down. Again, my hat's off to those responsible."

'Procedurally impossible'

But LaMotte also noted that many government regulations hinder the energy industry.

"Society's demanding us to go through this transition and do it in a cleaner and more sustainable way," ConocoPhillips chairman and CEO Ryan Lance said during a plenary session at CERAWEEK. "It's now become economically and technically a little bit more feasible with the advent of the IRA [Inflation Reduction Act]. It is still procedurally impossible."

Daniel Yergin, vice chairman of S&P Global and moderator of the session, stopped him cold and asked him to repeat. So, Lance did.

"It is still procedurally impossible for our country to go do this because our permitting doesn't allow us to build these things," he said. "It is not just our [Willow] Project in Alaska, it is across the board."

And across the border. During a session on the future of natural gas, Greg Ebel, chairman and CEO of Enbridge Inc., lamented the slew of failed western Canadian projects during what he has termed the "lost decade."

Among those scrapped in governmental squabbles:

- Frontier Oilsands Mine
- Northern Gateway pipeline
- Energy East pipeline
- Pacific Northwest LNG pipeline and export terminal
- Prince Rupert LNG export facility
- WCC LNG export terminal

"Instead of a lost decade ... we need a decade of consistency with respect to energy policy, permitting, all those things, and that's a huge change, right?" Ebel said.

The lack of consistency is costly in terms of a drop-off in investment.

"There is a big void in the amount of infrastructure that's not being built here in America," said Jack Fusco, president and CEO of Cheniere Energy, during the natural gas session, who added that 2022 represented the lowest level of investment in natural gas pipelines since 1993.

"We've got to change that."

Distrust abounds

For all of the complaints about the Biden administration's approach to oil and gas, the permitting reform bill proposed by Sen. Joe Manchin (D-W.Va.) generated considerable opposition from both sides of the aisle—despite the benefits it would have provided to fossil fuels and the energy transition.

"How would a developer build a plant to produce green hydrogen on the Gulf Coast?" Lance asked. First, secure the permits.

"Look at the size, scale, scope of that industrial complex," Lance said. "It's huge. It's another refinery. It's another petrochemical plant-sized facility. Can we actually get that permitting in the United States?"


In the current political environment, probably not.

To Elizabeth Rosenberg, assistant treasury secretary for terrorist financing and financial crimes, it's a matter of people not understanding what could have, and indeed was likely to have happened if nations had not acted swiftly and forcefully against Russia. The uncertainty unleashed by the war would have resulted in enormous upheaval for global equity markets as well as commodity markets, the expert panelists agreed.

People also don't realize the breadth of cooperation required, Rosenberg said. No single country acted on its own.

"There's been tremendous coordination between the EU, the U.K., the United States, Singapore, South Korea, Australia, Switzerland, Norway, etc.," she said. "It was never going to be just one—EU—that was banning all service provisions. Everyone moved together."

But trust built in a global alliance does not translate to trust in domestic policies, particularly when there is a feeling that the government is erecting hurdles to an industry's success.

"We've got plenty of [natural gas] product, particularly here in North America," Ebel said. "We know the world is hungry for it, and this is probably the greenest and freest place to actually produce those products. But if you can't actually get it to tidewater in the case of exports, or you can't get it to the market here in North America, it doesn't seem to make a lot of difference on our energy transition journey." 



"It's always hard to compare to the counterfactual.

What would have happened in the world if not for this?"

—Richard G. Newell, *Resources for the Future*



"It is still procedurally impossible for our country

to go do this because our permitting doesn't allow us to build these things. It is not just our [Willow] project in Alaska, it is across the board."

—Ryan Lance, *ConocoPhillips*



"There's been tremendous coordination between the

EU, the U.K., the United States, Singapore, South Korea, Australia, Switzerland, Norway, etc. It was never going to be just one—EU—that was banning all service provisions. Everyone moved together."

—Elizabeth Rosenberg, *U.S. Department of the Treasury*



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MITSUBISHI POWER TALKS UTAH HYDROGEN STORAGE

Mitsubishi Power Americas is developing a large hydrogen gas and storage hub with Magnum Development in Utah.



VELDA ADDISON
SENIOR EDITOR,
ENERGY TRANSITION
@VeldaAddison
vaddison@hartenergy.com

Mitsubishi Power Americas is working with Utah-based energy hub owner Magnum Development to develop what could become the largest hydrogen gas and storage hub in the U.S.

The Advanced Clean Energy Storage hub in Delta, Utah, (ACES Delta) will produce up to 100 metric tonnes per day of hydrogen using electrolyzers for delivery to the Western U.S., supporting Intermountain Power Agency's (IPA) 840-megawatt IPP Renewed Project.

Plans for ACES Delta include the ability to initially store 150 gigawatt hours of green hydrogen in two enormous salt caverns, providing a long-duration energy storage option needed for excess renewable power that can be dispatched to the grid when needed.

The project marks a first-of-its-kind market application, combining green hydrogen production and storage in salt caverns at a scale not yet seen by the electrolyzer industry.

"The great news is the technologies we're dealing with are not first-of-the-kind technologies," Mike Ducker, senior vice president of hydrogen infrastructure for Mitsubishi Power Americas and COO of ACES Delta, told Hart Energy. Electrolyzers have been around for nearly a century, and storing hydrogen in salt caverns has been done since the 1980s, he said. "What is unique and novel here is the application and the integration of that scale."

Hart Energy sat down with Ducker at CERAWEEK by S&P Global to discuss the project.

Velda Addison: Why green hydrogen, why Utah and why now?

Mike Ducker: Looking at the grid right now, and particularly in western United States, everyone's familiar with the duck curve—middle of the day sun, late day peak—and that's where batteries play a very important role in supporting that intraday energy imbalance. We're starting at just 30% renewables today in the West. We're no longer looking to solve just that issue; it's now this seasonal imbalance. To put it in perspective, California, on average over the past few years in the winter and spring months, is curtailing 300 to 600 gigawatt hours every month. This is solar and wind that's being thrown away because there's nowhere to put it. Yet in 2020, in the summer, they saw the first rolling blackouts in two decades. We have a dynamic where we've got way over production in certain seasons of the year and then way



under production—and that's just 30% renewables. As we go toward 100%, that problem is going to be exacerbated.

So why green hydrogen? This project goes to that exact issue of we now need

different technologies, different ways to integrate renewables more cost effectively, more reliably. This is where hydrogen plays a role—to basically take all that excess into the winter and spring months, store that in these massive salt caverns under the ground. When IPA wants firm, reliable, dispatchable energy that's also zero carbon, they are able to run it in the summer and fall months, for example.

VA: What makes salt caverns ideal for hydrogen storage?

MD: Hydrogen has been stored in salt caverns as early as the 1980s. Salt caverns can also store other hydrocarbon gases. They can store helium. They are great at storing tiny particle gas molecules. ... We engineer and design these caverns. What exists today is a block of salt beneath the earth. We're actually drilling and doing a process where we control the creation of this cavern by adding water that dissolves the salt. Depending on how long we let the water sit in there, where we inject the water, we can actually intentionally grow this cavern vertically and horizontally. There are engineering designs around how we do that, so we're able to keep mechanical integrity of the cavern.

The salt itself has a lot of very unique characteristics. They say salt is self-healing. So if there are any cracks or fissures, it actually heals itself. It's impermeable. So again, for gases like helium or hydrogen, that's inescapable through the salt. Those two main factors make it very attractive. From a recovery standpoint, every molecule you put in, you can get that molecule back out. With an abandoned oil and gas field, once you put hydrogen in there, you have no idea where it goes. With a salt cavern, it's in that vacuum container basically.

VA: How much hydrogen are you planning to store?

MD: We will be able to store over 11,000 metric tons of hydrogen. We relate that more into the dispatchable energy potential. So each cavern can store about 150 gigawatt hours' worth of dispatchable energy. That's 300 gigawatt hours total. To put it in perspective, in 2021, the entire United States had just under 3 gigawatts hours'



Mitsubishi Power says the long-duration energy storage capability of the salt caverns will help improve resource adequacy and decrease costs by capturing excess renewable power when it is abundant and dispatching it back on the grid when it is needed.

Source: Mitsubishi Power



“Our one site will be 100 times the entire U.S. installed base of batteries as of 2021.”

—Mike Ducker, Mitsubishi Power Americas

worth of batteries installed. Our one site will be 100 times the entire U.S. installed base of batteries as of 2021.

VA: How long can you store the hydrogen in the salt caverns?

MD: Day, week, a month, a year—however, long IPA wants as it looks at seasonal energy imbalances and desires to store it. When we inject that hydrogen, it will tend to be a continuous injection through that winter and spring months and then tend to be a continued withdrawal through the summer and fall. But if we need to inject, stop and bottle it up and hold for two months, we could do that as well.

VA: Does the movement of salt impact the volume of the hydrogen at all? During recovery, could some of the hydrogen be lost?

MD: We will always maintain a minimum pressure in the caverns because like I said, salt has that self-healing aspect. If you have nothing in that void, it's going to want over time to heal itself. As far as losing hydrogen, it's impermeable. There is nowhere for that hydrogen to go other than up through your wellhead, and we've got constant monitoring and multiple layers of these casings. We're also required to do constant testing. Mechanical integrity tests [to check pressure and for leaks] are required. It is a very regulated process. At the end of the day when you look at the caverns, that is what makes them so attractive here. There is no opportunity for leaks. There are no losses here.

VA: What challenges have you faced with the project?

MD: When we started bidding this project back in 2020,


the electrolyzer industry had only ever known [to] sell, say, a 5-megawatt or 2-megawatt cell stack to a food grade beverage or to a university. They're one-offs. When we said we need 220 megawatts, they said, “OK, well, here's all the equipment. You put all this stuff together.” We realized nobody had ever designed a plant where electrolyzers were the main energy infrastructure. Electrolyzers have always historically been kind of an ancillary on another infrastructure project.

So, we had to look at what was the best way to design and put together the facility, optimize our own cost and reliability where the electrolyzers were really the focal point.

The other biggest thing I'd point out is the commercial negotiations. With the Intermountain Power Agency, our ultimate offtaker here, it doesn't have a whole repository of contracts for energy storage and conversion of hydrogen. They have it for solar; they have it for wind and they had for gas turbines. How do you get that customer comfortable in knowing that we're putting forward a credible, de-risked offer? That required an immense amount of collaboration and coordination between the teams. We really had a blank piece of paper to work from. Pulling together contracts and agreements was a really huge undertaking. It was about a year-long negotiation at the end of the day.

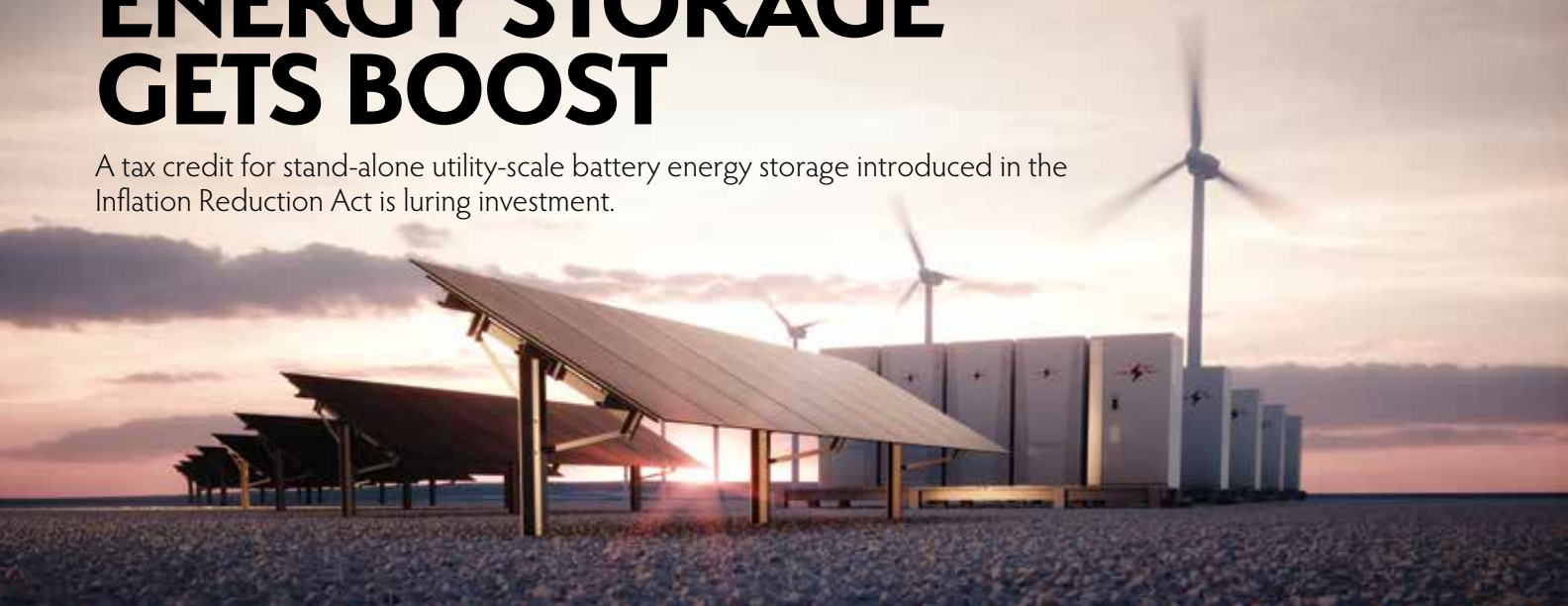
VA: Recurring themes at the CERWeek conference has been hydrogen and the Inflation Reduction Act. How do you anticipate the IRA impacting the company?

MD: Gamechanger. It really is a huge impact. When we look at the pricing of clean hydrogen versus gray or unabated hydrogen, that's where we see it [green hydrogen] is the same or a lower cost. The question really now comes more on the offtake side. We've got existing industries that are using hydrogen: refineries to agriculture to steelmakers. So, there are existing uses for it, but it will take some time to start looking at existing applications.

But how do you look at new growth and new opportunities? That's where we're spending most of our time now. We've got the cost to be where it's attractive. How do we look at all these different industries from there? But in short, yes, it's been a very big impact in a positive way for what we were projecting. Success rates and probabilities for projects change pretty dramatically in the positive sense since its passing. 

ENERGY STORAGE GETS BOOST

A tax credit for stand-alone utility-scale battery energy storage introduced in the Inflation Reduction Act is luring investment.



Shutterstock/petmalinak

Between 2023 and 2027, the U.S. storage market is forecast to install nearly 75 GW, with grid-scale installations accounting for 81% of total capacity, according to a report by Wood Mackenzie Power & Renewables/American Clean Power Association.

in VELDA ADDISON

SENIOR EDITOR,
ENERGY TRANSITION

@VeldaAddison

vaddison@hartenergy.com

As the U.S. embraces an all-of-the-above energy strategy, balancing energy security with needs to lower emissions and meet demand, battery storage has become a crucial grid balancer.

The energy storage investment tax credit provided in the Inflation Reduction Act (IRA) is giving it strength, luring investors to projects focused on storing excess energy when the wind doesn't blow and the sun doesn't shine.

"Battery storage is really one of the key ways of addressing that intermittency," David Burton, partner at Norton Rose Fulbright US, told Hart Energy. "As fossil-fired plants age, it provides backup contingency power if a fossil plant goes down due to needing maintenance or having other issues. It's also useful as we have weather events to smooth out the production levels during that."

Burton is one of the attorneys who advised Eolian LP, a portfolio company of investment fund Global Infrastructure Partners that closed a tax equity investment in two standalone utility-scale battery storage projects in Texas. Eolian said the deal, made public in February, marked the first time the investment tax credit (ITC) for a stand-alone, utility-scale battery energy storage system was used since the IRA took effect in January 2023.

"If someone's willing to give you a 30% tax credit, of course you want that," Burton said. "A 30% minimum tax credit is pretty attractive."

'New face of grid resilience'

With a combined operating capacity of 200 megawatts (MW), the Madero and Ignacio



Source: Wärtsilä Corp.

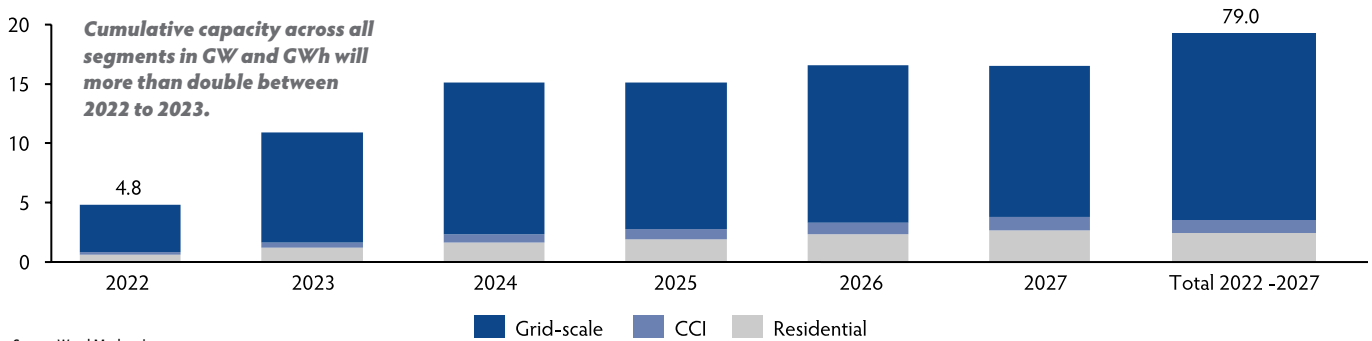
Wärtsilä will supply 200 MW of energy storage systems for two energy storage projects in South Texas.

projects are interconnected battery storage facilities located on one site in Mission, Texas, in a part of the Deep South's Rio Grande Valley bordering Mexico. Scheduled to begin full commercial operations this year, Eolian said the facilities would become part of the liquid energy market managed by the Electric Reliability Council of Texas, having been "engineered with multiple hours of operational duration to provide critical grid resiliency."

The tax equity investment, used by investors to fund projects for the right to claim that investment's tax credits, was made by Florida-based Churchill Statewide Group. The group is comprised of real estate financial services companies.

"This energy storage project is the largest of its kind in the world, represents hundreds of millions of dollars in direct investment by private investors, and solves the problem of meeting demand during hours of high uncertainty that

US Energy Storage Five-Year Market Outlook



require highly dynamic units that can turn on remotely and instantaneously to keep the lights on," Eolian CEO Aaron Zubaty said in a news release. "The new face of grid resilience is fast and flexible energy storage to fill the gaps when other resources are too slow or too fragile to meet the challenge."

A March 2023 report by the Wood Mackenzie Power & Renewables/American Clean Power Association showed the U.S. storage market added 1,067 MW/3,030 MWh across all segments in fourth-quarter 2022, marking the fifth highest overall quarter on record in MW-terms amid supply chain challenges.

"Between 2023 and 2027, the U.S. storage market will install almost 75 GW, with grid-scale installations accounting for 81% of total capacity," the report stated.

With 30% through 2032, the ITC for stand-alone energy storage assets in the IRA is incentivizing investment. The law made energy storage systems with at least a 5-kWh capacity eligible, including stand-alone systems, those co-located with solar and microgrid controllers. Provisions also include prevailing wage and apprenticeship requirements, with an exemption for smaller projects, plus direct pay.

'A more certain path'

Prior to the IRA's passage, the ITC didn't apply to energy storage projects.

"If you didn't have a large tax liability [to] offset the tax credits, then tax equity was really your only alternative. And it allowed you to capture much of the value of the tax credits and the depreciation, even though you couldn't use them yourselves," Burton said. "The IRA gave us transferability whereby tax credits can literally be sold pursuant to a bill of sale without doing a complicated tax equity financing transaction."

Transferability would have been an alternative for Eolian; however, the tax equity was not only more lucrative financially and could be monetized, it could also raise cash sooner than waiting for year-end to transfer the credits the following year, Burton said. "So, it was a more certain path than the transferability tax credits set of rules that the IRA gave us," he said.

Pursuing the new ITC for the energy storage project was no different than any other investment tax credit-tax equity transaction, according to Burton.

"Generally, it follows a similar pattern as other ITC tax-free transactions, but we had to get comfortable with the IRA and [determine] whether the project qualified," he said "Then, it was a matter of approaching the tax equity market."

When looking to pursue the ITC, Burton said a net should be cast wide when seeking tax equity investors, and conversations should take place early and often to gauge interest and comfort with the project.



"This is actually a great time for the energy storage market."

—Marissa Alcalá, Norton Rose Fulbright US LLP



"Cast a wide net when looking for tax equity investors and have conversations with them relatively early to gauge their interest and comfort with the project."

—David Burton, Norton Rose Fulbright US LLP

—David Burton, Norton Rose Fulbright US LLP

'Great time for energy storage'

Some tax equity investors may have a learning curve when it comes to the different nature of revenue streams for standalone battery storage projects, said Marissa Alcalá, co-partner-in-charge for Norton Rose Fulbright. In some locations, owners of storage facilities co-located with wind or solar projects can earn revenue via different types of contracts. Such revenue streams could be for ancillary or grid-balancing services.


The ITC is expected to help expand the energy storage market. However, other mechanisms could provide a boost.

Domestic manufacturing of infrastructure equipment could be a positive in reducing some of the supply chain challenges, Alcalá said. That could open the door to additional incentives.

Improvements to transmission lines and the permitting and approval process from various jurisdictions would also help, Burton added.

"This is actually a great time for the energy storage market," Alcalá said.

With the growth of renewables, activity and interest in the energy storage market are growing.

"It's become increasingly important for effective regulation and operation of the grid as well as an increasingly useful tool for companies who are trying to use or include renewable energy to be able to store and then utilize during off hours," said Alcalá. "When you combine the two components ... battery storage is going to be an increasingly important component of the energy sector." 

BISON IV WINS \$500 MILLION IN BACKING FROM QUANTUM

Houston-based private equity firm Quantum Energy Partners is backing Bison Oil & Gas IV to acquire and develop oil and gas assets in Colorado and Wyoming.



CHRIS MATHEWS
SENIOR EDITOR, SHALE/A&D
@chrismathews52
cmathews@hartenergy.com

Private equity firm Quantum Energy Partners is backing a new iteration of Bison Oil & Gas to pursue deals in the Denver-Julesburg Basin (D-J), and the E&P has already acquired acreage and production through several deals.

Houston-based Quantum has committed more than \$500 million in equity capital to form Bison Oil & Gas IV LLC, which will focus on acquiring and developing oil and gas assets in the D-J Basin in Colorado and Wyoming, Quantum said on Feb. 22.

The announcement follows a number of other private equity funds that have announced new or additional financial backing for oil and gas portfolios in 2023.

Since being formed, Bison IV has closed on multiple acquisitions to purchase over 75,000 net acres with current production of more than 25,000 boe/d.

"We look forward to building on the prior successes of the Bison franchise with Quantum Energy Partners at Bison IV," Bison IV CEO Austin Akers said in the Feb. 22 news release. "We at Bison believe the D-J Basin possesses some of the most economic development opportunities in North America, and we appreciate Quantum's support to facilitate a consolidation of such an opportunity-rich basin."

Now in its fourth iteration, Denver-based Bison IV has a similar mission to its predecessor companies. The first Bison developed a D-J Basin portfolio and ended up selling to Extraction Oil & Gas Inc.

Bison Oil & Gas II also focused its portfolio on the D-J Basin before being acquired by Denver-based Civitas Resources Inc. for \$300 million in cash last year. The Bison acquisition, which was originally valued at \$346 million before being modified into an all-cash transaction, added 102 gross locations in the D-J Basin to Civitas' portfolio.

Bison Oil & Gas III was formed in late 2019 to focus on opportunities in North Dakota. In June 2022, Bison III sold the majority of its holdings in the Bakken to an unnamed buyer. The company continues to hold certain nonoperated interests in the D-J Basin in Colorado, according to Bison's website.

All three of the previous Bisons were backed by Houston-based Carnelian Energy Capital Management LP.

"We are pleased to partner with Austin Akers, David Gonzales and the broader Bison team," said Quantum managing director Alex Jackson. "We have followed Bison closely for many years and they have proven to be exceptional entrepreneurs, high-quality operators of unconventional resources and responsible stewards of their assets."

Private equity greases the wheels


While energy-focused private equity isn't expected to return to the glory days of 2015 or 2017, energy and finance advisory Tudor, Pickering, Holt & Co. (TPH) does anticipate a much more liquid private equity space in 2023, TPH president Chad Michael recently observed.

In January, EnCap Investments LP committed additional equity backing to Double Eagle Energy Holdings IV LLC to support Double Eagle's strategy of acquiring and developing drilling opportunities in the Permian Basin.

The additional equity capital from EnCap, as well as a reserve-based lending facility led by JP Morgan Chase, extended Double Eagle and Tumbleweed Royalty IV LLC's capital runway to \$2.3 billion.

Last year, Double Eagle and Tumbleweed received backing from EnCap and minority investments from Apollo Global Management LLC, Magnetar Capital and other backers totaling over \$1.7 billion.

Private equity firm Andros Capital Partners LLC announced closing its second investment fund at \$750 million last month. Similar to its first fund, Andros plans to pursue private equity deals, credit opportunities and direct asset-level investments with Andros Energy Capital II LP.

Meanwhile, Houston's North Hudson Resources Partners LP launched a \$275 million credit fund to support middle-market onshore oil and gas production companies in North America. North Hudson's inaugural credit fund primarily provides senior secured loans between \$20 million and \$50 million. 



**SUBMIT YOUR
NOMINATION**



2023 ENERGY ESG Awards

Hart Energy is recognizing innovations in reducing environmental impact, social efforts and community contributions, as well as leadership practices/directives and company cultures within a corporate structure.

Nominations are open to producers, operators, services companies and midstream companies in the oil and gas industry. Winners are chosen based on achievements, not only on goals.

Awards will be presented during Hart Energy's upcoming **Energy ESG conference, August 30, 2023**, in Houston. These ESG champions will also be highlighted with in-depth profiles inside a special section of *Oil and Gas Investor* in September and promoted through Hart Energy's multi-channel network.

Nominations due June 2, 2023.

HART ENERGY  **LIVE**



**NOMINATE
TODAY!**

hartenergy.com/energy-esg-awards



WHY INVESTING IN CLEAN ENERGY PRODUCTION IS A BOON FOR OIL AND GAS



PATRICK MCRORIE
LATHROP GPM

Patrick McRorie leads the energy team of law firm Lathrop GPM and is partner-in-charge of the Denver office.

Oil and gas companies had a remarkable year in 2022. Record profits and technological innovations empowered decision makers to expand domestic energy production, slash debts and return cash to investors through stock buybacks and variable dividends.

Typically, companies in this position arrive at a crossroads: They can either prioritize shareholder expectations for quarterly growth or shore up the long-term sustainability of their operations. But the results of Lathrop GPM's third annual "Oil & Gas Market Update" suggest that oil and gas executives are choosing to walk and chew gum at the same time.

Several factors are driving the shift to this dual-pronged business strategy. Rising inflation and geopolitical turmoil have demonstrated the importance of diversified and domestic business investments to safeguard the industry's future. U.S. energy demand is increasing, as are calls for a broader shift to alternative energy sources.

These developments have forced oil and gas executives to thread the needle between long-term and short-term goals. And for the most part, they've landed on a common set of solutions: 47% of energy and utilities executives have reported a commitment to a CO₂ emissions reduction or net-zero emissions goal, and our survey respondents named energy efficiency improvements as their leading focus for diversified investments.

Why does that path appeal to oil and gas executives, and what are the new opportunities that the clean energy transition offers?

Emissions reduction a win-win

Shareholder pressures continue to mount as ESG-focused investing becomes more commonplace. In fact, more than \$30 trillion is projected to pour into ESG-focused investments by 2030, and large institutions have begun to include more specific expectations for companies claiming to meet ESG criteria. To court these environmentally conscious investors, oil and gas companies recognize the need to develop a long-term carbon reduction plan and provide ESG disclosures in the interim.

But the move to reduce emissions isn't just about placating investors. ESG factors

appear to have a consistently positive impact on companies' financial performance. Sustainability initiatives also appear to drive better results, in part because of improved risk management and increased innovation. Not to mention an early move to carbon reduction could stave off pressure from regulators as they race to standardize and formalize ESG reporting in the U.S.

It tracks then, that nearly three-fourths of industry leaders in our survey said that ESG policies were in development or already in place at their companies, with industry standards and regulations their primary motivations for adoption. Further, more than seven in 10 oil and gas decision makers saw opportunity in the growing focus on renewables and environmental initiatives.

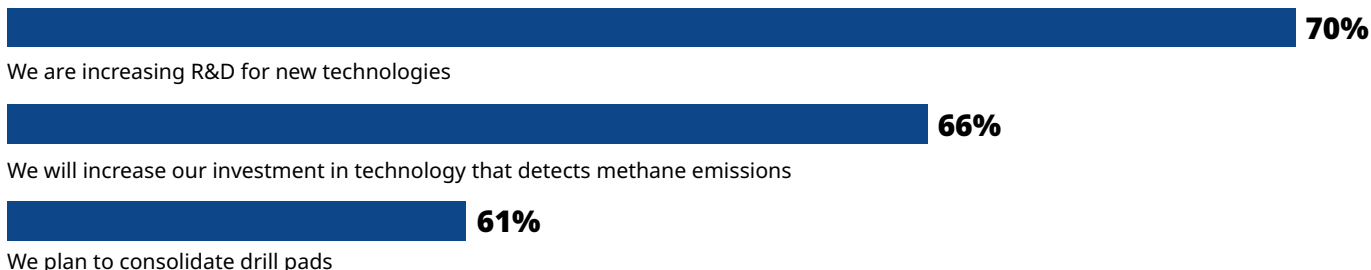
As these trends ramp up, oil and gas companies should consider taking a page from companies such as Marathon Oil Corp., which ties greenhouse-gas (GHG) reduction targets to yearly cash bonuses for employees, or VAALCO Energy, which links executive compensation to ESG factors such as carbon footprint-reduction targets and improved reporting of air, water and waste metrics. Doing so could set them on a path toward stronger investments, limited disruption from regulators and even profitability over the coming decade.

Sustainability leads to efficiency

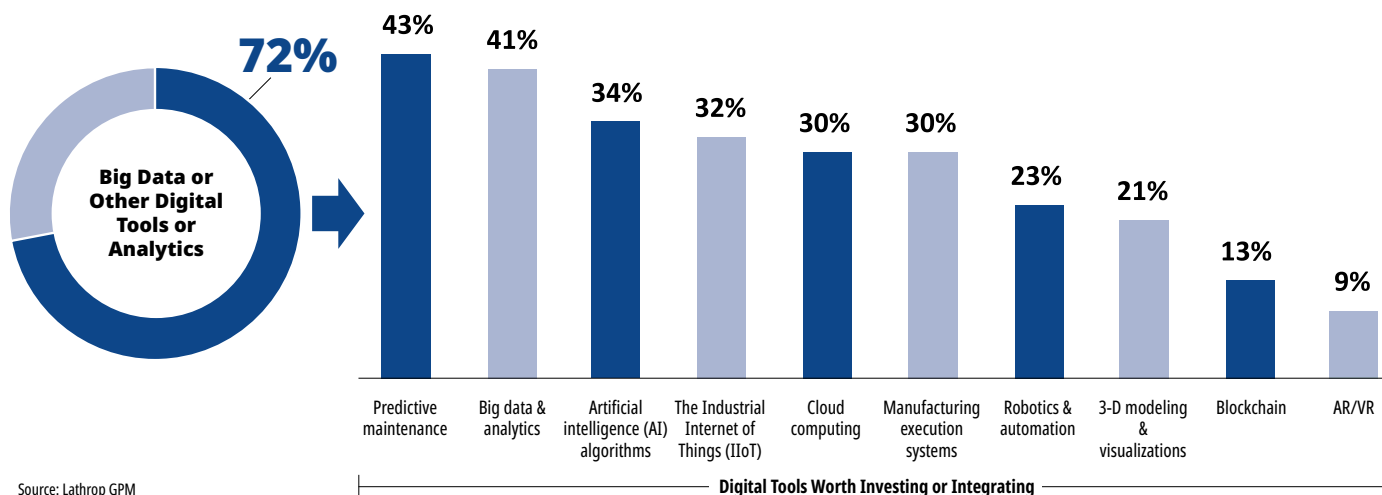
At least two-thirds of oil and gas executives that were surveyed said they would focus on new technologies heading into 2023—and among those projects, carbon capture and methane emission reduction dominated companies' large-scale investments. This sprint toward innovation wasn't just spurred by public outcry or investor relations. The industry's advances could make energy production more efficient, driving down costs and opening up new sources of revenue.

Carbon capture in particular is an attractive prospect for industry heads because it doesn't require a full-scale pivot to renewables. And with the passage of President Biden's sweeping climate package last September, billions of dollars have been

O&G Execs' Strategic Planning Focus Areas For 2023: New Projects And Technologies



O&G Execs' Strategic Planning Focus Area For 2023



earmarked to support new carbon capture technology.

Not ones to leave money on the table, industry leaders launched a diverse array of carbon capture projects. Exxon Mobil Corp., CF Industries and EnLink Midstream recently joined forces to capture 2 million metric tons of CO₂ annually—the project is slated to get off the ground in 2025. Occidental Petroleum Corp. plans to finance a project to capture CO₂ from the Permian Basin and store it underground, using it to increase pressure in the oil field and unearth—you guessed it—more petroleum. Although not necessarily a long-term solution to climate change, carbon capture projects such as Occidental's have the potential to lower oil recovery costs, drive drilling efficiencies and reduce GHG emissions.

Oil and gas companies have also trained their sights on recapturing methane, a GHG that scientists believe could one day be used in the manufacture of organic chemicals and fuel. Leading industry players are now deploying sensors to detect methane leaks from aircraft or satellites. Preventing such leaks will not only help them meet emissions targets but could prove lucrative in the long run. In fact, companies who haven't devoted R&D efforts to this burgeoning technology risk falling behind the curve—the scientific community's recent efforts to craft a scalable process for converting methane into methanol, for example, have shown great promise.

Another notable finding from our survey: Industry leaders believe digitization can also help streamline energy production and day-to-day operations. The integration of technologies such as cloud computing and predictive drilling analytics is helping industry players increase productivity. Using intelligent automation—a tantalizing proposition in today's tight industry labor

“The move to reduce emissions isn't just about placating investors. ESG factors appear to have a consistently positive impact on companies' financial performance.”

market—companies can monitor workloads and boost server utilization to optimize their investments while reducing their environmental footprint.

Recent breakthroughs in AI, like ChatGPT, suggest full automation of drilling processes may be within grasp before the end of the decade. To reap these production efficiencies, oil and gas companies will have to sincerely consider transforming into digital-first organizations.

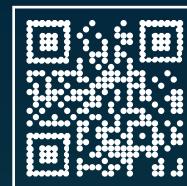
2023 off to a strong start

Coming off an impressive year, oil and gas businesses may feel tempted to rest on their laurels. But today's volatile political and economic climate could easily catch up to them. Industry leaders should continue leveraging this high cash flow, low-debt environment to introduce larger, diversified investments in clean and efficient energy production. Many industry players have taken their first steps toward a sustainable, carbon-neutral future. But 2023 is already well underway, and industry executives need to keep moving to ensure they don't get left behind.

NEW FINANCINGS

EQUITY

Company	Exchange/ Symbol	Headquarters	Amount (\$MM)	Comments
Atlas Energy Solutions Inc.	NYSE: AESI	Austin, Texas	N/A	Launched an IPO of 18 million Class A common stock shares. The shares had an anticipated initial offering price of \$20 to \$23 per share. Underwriters had the option to purchase up to 2.7 million additional common stock shares. Goldman Sachs & Co., BofA Securities and Piper Sandler are lead book-running managers, while RBC Capital Markets, Barclays and Citigroup were passive book-running managers for the offering. Raymond James, Johnson Rice & Co. LLC Stephens Inc., Capital One Securities, Pickering Energy Partners and Drexel Hamilton were acting as additional co-managers for the offering.
Pembina Pipeline Corp.	TSX: PPL NYSE: PBA	Calgary, Alberta	N/A	Announced that holders of an aggregate of 1,028,130 of its 16 million cumulative redeemable minimum rate reset Class A preferred shares, Series 21 (Series 21 shares) have elected to convert, on a one-for-one basis, their Series 21 shares into cumulative redeemable floating rate Class A preferred shares, Series 22. As a result, Pembina had 14,971,870 Series 21 shares and 1,028,130 Series 22 shares issued and outstanding as of March 1.
NRG Energy Inc.	NYSE: NRG	Houston	N/A	Priced its offerings of \$740 million aggregate principal amount of 7% senior secured first lien notes due 2033 at a price to the public of 98.749% of their face value and 650,000 shares of 10.25% Series A fixed-rate reset cumulative redeemable perpetual preferred stock, with a \$1,000 liquidation preference per share. The net proceeds from the offerings will partially fund the purchase price of NRG's previously announced acquisition of Vivint Smart Home Inc. and to pay fees and expenses relating to the acquisition.
Solaris Oilfield Infrastructure Inc.	NYSE: SOI	Houston	\$50	Approved an enhanced shareholder return program, including an increase in the quarterly cash dividend to 11 cents per share and authorization of a \$50 million share repurchase program. The dividend of 11 cents per share represents an increase of approximately 5%. This announcement represents Solaris' second dividend increase and its 18th consecutive quarterly dividend. The \$50 million share repurchase authorization was effective immediately and does not have a fixed expiration date. Assuming full execution of the repurchase program at the current share price, Solaris would expect the retirement of approximately 11% of its outstanding shares.
Flowserve Corp.	NYSE: FLS	Irving, Texas	N/A	Authorized a quarterly cash dividend of 20 cents per share on the company's outstanding shares of common stock. The dividend is payable on April 7, 2023, to shareholders of record as of the close of business on March 24, 2023. While Flowserve currently intends to pay regular quarterly cash dividends for the foreseeable future, any future dividends, at this 20 cents per share rate or otherwise, will be reviewed individually and declared by its board at its discretion.
Hess Corp.	NYSE: HES	New York	N/A	Declared a regular quarterly dividend of 43.75 cents per share payable on the common stock of the corporation on March 30, 2023, to holders of record at the close of business on March 13, 2023. The dividend represents an approximate 17% increase compared to the dividend for the fourth quarter of 2022, which equals a 25 cent increase per share on an annualized basis.
Desert Mountain Energy Corp.	TSXV: DME	Vancouver, Canada	C\$20	Announced that it intends to issue up to 10.3 million units of its public offering at a price of C\$1.95 per unit for an aggregate gross proceeds of up to about C\$20 million. Beacon Securities Limited is acting as sole agent in connection with the offering. Each unit will consist of one common share in the capital of the company and one common share purchase warrant of the company. Each warrant will entitle the holder thereof to acquire one common share at a price per warrant share of C\$2.70 for a period of 24 months following the closing date. Freedom Capital Markets is acting as advisor to the company in connection with the offering.



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EQUITY

Company	Exchange/ Symbol	Headquarters	Amount (\$MM)	Comments
Range Resources Corp.	NYSE: RRC	Fort Worth, Texas	N/A	Announced that its board of directors declared a quarterly cash dividend on its common stock for the first quarter. A dividend of 8 cents per common share was payable on March 31, 2023, to stockholders of record at the close of business on March 15, 2023.
Occidental Petroleum Corp.	NYSE: OXY	Houston	N/A	Announced that its board of directors has declared a regular quarterly dividend of 18 cents per share on common stock, payable on April 17, 2023, to stockholders of record as of the close of business on March 10, 2023. On an annual basis, the dividend is 72 cents per share at the new rate, compared to the previous annual rate of 52 cents per share.

DEBT

Company	Exchange/ Symbol	Headquarters	Amount (\$MM)	Comments
EIG	NYSE: EIG	Washington, D.C.	\$4,800	Announced the completion of its acquisition of a 25% interest in Repsol Upstream by Breakwater Energy , a wholly owned subsidiary of EIG. Breakwater acquired the 25% interest for a total consideration of approximately \$4.8 billion, including debt, with Repsol holding the remaining 75%. Goldman Sachs & Co LLC and J.P. Morgan acted as financial advisors to EIG in connection with the transaction. Goldman Sachs & Co LLC, J.P. Morgan and Lazard acted as capital markets advisors in connection with the financing of the transaction. Latham & Watkins and Debevoise & Plimpton LLP served as EIG's legal advisors.
FourQuest Energy Inc.	N/A	Houston	N/A	Acquired privately owned Dubai, UAE-based Caley Energy FZCO . Founded in 2014 by Charlie Topp, Caley Energy FZCO is a leading provider of specialist equipment and personnel to the major service providers of the process and pipeline industry throughout the Middle East, Africa and Caspian region. Derek Grimley, director of Caley Energy, has been appointed the regional manager for the newly formed Middle East, Africa and Caspian region of FourQuest Energy.
Heelstone Renewable Energy LLC	N/A	Chapel Hill, N.C.	\$175	Announced in the fourth quarter of 2022 it closed on a \$175 million credit facility with BlackRock Alternatives , through a fund managed by its infrastructure debt business, to fund the initial construction and development of utility-scale solar and battery storage projects. Heelstone currently has 248 megawatts alternating current (MWAC) projects under construction in Georgia and Pennsylvania and plans to have another 255 MWAC in Pennsylvania, New Jersey and Maryland under construction by end of 2024.
Diversified Energy Co. PLC	LSE: DEC	Birmingham, AL	\$244	Announced the closing of its acquisition of certain upstream assets and related facilities in Texas, within the company's central region, from Tanos Energy Holdings II LLC , a portfolio company of Quantum Energy Partners . Concurrently, the company also completed an acquisition-related redetermination of the borrowing base of its sustainability-linked loan resulting in a 50%, or \$125 million increase, in the borrowing base to \$375 million.

OIL, GAS DEMAND TO OVERTAKE SUPPLY BY YEAR-END



in DENNIS KISSLER
BOK FINANCIAL SECURITIES

Dennis Kissler is the senior vice president for trading at BOK Financial Securities. He is based in Oklahoma City.

Dennis Kissler has fed his passion for analytical research and the trading of crude oil and natural gas futures and derivatives for more than 15 years at BOK Financial Securities, but he's been managing commodity risk and developing hedging strategies for decades. In this edition of Market Watchers, Kissler shares his insights with Oil and Gas Investor's editor-in-chief, Deon Daugherty, on some of the greatest gambles ahead.

Deon Daugherty: How do you view the domestic E&P sector's performance [production, growth, M&A] in 2022? What are companies doing well, and in what ways should they consider changing course? What are your expectations for the space this year?

Dennis Kissler: Energy prices have improved dramatically. And at the same time, most energy companies have practiced a more disciplinary approach to capital spending, which has increased profitability exponentially for companies that have had a good risk management program.

Going forward into 2023, it will become more challenging as volatility in prices should continue. Therefore, companies should continue with realistic budgets and view oil and gas prices in the '24, '25 and even the '26 year strips to make procurement drilling decisions and understand where breakevens versus profitability are versus their basis locations.

DD: To what extent might infrastructure underinvestment impact the U.S. market, and how might it limit the U.S.' competitive position globally?

DK: I believe underinvestment is currently in play and that at year-end 2023 and into 2024 demand will once again begin to overtake supply. Of course, a major global recession or COVID lockdown in Asia could reset everything. U.S. shale could very well plateau production in the next 24 months—net perhaps of the Bakken.

Jet traffic and Asian road traffic is once again back to or above pre-COVID levels. Further drilling and production regulations if implemented could expedite the issue. Keep in mind, whomever controls your fuel supply also controls your food supply. You cannot plant corn and wheat without diesel.

DD: What can the energy industry as a whole do differently to attract growth investors back to the space?

DK: Companies must return capital back to the investors and shareholders and show proper risk management. Hedging policies are in place. Also, an advertising-type

“A lot of people don't understand the importance of market liquidity that small speculators bring to the market.”

program that shows fossil fuels are a need and not just a want.

The transition away from fossil fuels takes time—a lot of time—and that needs to be communicated. The Tesla will not drive itself without the natural gas to produce the electricity. Europe is beginning to understand this now but a broader educational campaign is needed.



DD: What is driving the volatility in global crude prices?

DK: Supply and demand is becoming very erratic given the COVID shutdown in Asia and then the reopening and the Russian/Ukraine war.

Extremely high margin requirements by the exchange have taken a lot of the small speculators out of crude and natural gas futures, and when that happens, the liquidity suffers and becomes a “thin” type market which causes wide price swings. A lot of people don't understand the importance of market liquidity that small speculators bring to the market.

DD: What happened to the expectation of resurgent demand from China post-COVID? How has it impacted global markets?

DK: The demand caused by China's reopening has been a bit slower than expected mostly from the tighter monetary programs from world banks increasing interest rates.

Keep in mind China is a major exporter of goods and world economies have been pausing a bit due to higher interest rates. That being said, China is a large consumer

“Keep in mind, whomever controls your fuel supply also controls your food supply. You cannot plant corn and wheat without diesel.”

of petroleum products and we should see their demand continue to rise in the coming weeks.

DD: How do you envision the long-term impact of Russia's war on Ukraine and its essential weaponization of energy?

DK: It has been and will continue to change the face of European energy dependence. The U.S. should be the biggest beneficiary as LNG and fuel demand in Europe will look toward North America for supply. I believe this would continue even if some sort of "truce" or peace talk were executed. This will be a long-lasting effect.

DD: What are your views on the validity and efficacy of OPEC+, given Russia's aggression during the past year?


DK: OPEC+, I believe, will stick together. Longer term, I also believe their production outlook could be overstated. Nineteen of the 23 members are having trouble meeting production metrics at this time. Saudi Aramco may accomplish a reinvestment back into production which, if

it occurs, will take years to come to market. In the next two to three years, I believe Russia, along with OPEC, will be challenged to make production quotas and could be well short of production expectations.

DD: How do you view the success or failure of U.S. sanctions and EU price caps relative to Russia?

DK: Sanctions have had a negative effect on Russian income. However, as long as China and India continue to take Russian production, the effects have been minimized.

DD: Given the dramatic shift in the oil and gas global market in response to Russia's aggression, how do you view the future of supply/demand in Europe specifically and, more broadly, around the world?

DK: It has been and will continue to change the face of European energy dependence. The U.S. should be the biggest beneficiary as LNG and fuel demand in Europe will look toward North America for supply. I believe this will be a long-lasting effect and a positive to North American prices. 



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Building Bridges

New Enbridge CEO Greg Ebel on making connections across the continent and around the globe.



JORDAN BLUM
EDITORIAL DIRECTOR

@JDBlum23

jblum@hartenergy.com

Greg Ebel bemoans Russia's ongoing war in Ukraine, but he recognizes Vladimir Putin's broader geopolitical conflict with the West makes the energy his company moves more valuable to the world than ever before.

"We've got to find ways to transition quicker if possible," Ebel said in an interview with Hart Energy. "But there's Enbridge, Johnny-on-the-spot with liquids, gas, renewables and the ability to sequester [carbon]. It's all connected, and it all works."

The new president and CEO of Enbridge, Ebel splits his time between North America's largest midstream players' two biggest strongholds, Alberta and the Texas Gulf Coast. Ebel called Houston home when he led Spectra Energy until it merged with Enbridge in 2017.

Enbridge is fulfilling its corporate name like never before, serving as the energy bridge to "keep the lights on" as Ebel likes to put it. No energy company traverses the U.S. and Canada as much, moving crude oil, natural gas or electricity to 42 states and eight Canadian provinces.

Enbridge ships nearly one-third of North America's crude oil and almost 20% of the natural gas consumed in the U.S., as well as operating North America's third-largest natural gas utility.

But, now, Enbridge is focused on exporting oil and LNG around the world, while also building more renewable energy in Europe. Pardon the forced alliteration, but Enbridge is increasingly moving oil and gas from Calgary and Corpus Christi to Korea and Copenhagen.

Ebel emphasized that Enbridge's goal is being the "first-choice energy delivery company in North America and beyond," but with a pivot increasingly on "the beyond."

"I think you find the public outside of North America are really knocking on the door to say, 'You guys have so much energy in North America—plenty to fuel your own future. But we need it, and we need it more than ever thanks to what's been going on in Europe. So, please, deliver it,'" Ebel said.

Rapid growth for exports

With a market capitalization value frequently flirting with \$80 billion and a workforce of more than 12,000 people, Enbridge carries at least twice the value of any of its pipeline peers with the sole exception of Houston's Enterprise Products Partners, which is still nearly 40% behind Enbridge.

But don't just call Enbridge a pipeline company. It is better to use the vague and gobbledygook term "infrastructure," which is more accurate precisely because it is so broad.

"It's a sprawling empire of midstream assets for sure," said Hinds Howard, a portfolio manager at CBRE Investment Management. "They're doing all things, but the collection is a sound business."

With a steadily growing dividend and 4% to 6% annual EBITDA growth, Howard likes the totality of the proposition at Enbridge.

"They seem to have their balance sheet in a solid position to be able to do all of those things. That's in contrast to some of their peers," Howard said. "They're maybe not the sexiest story out there, but they're solid and reliable and have long-term contracts, and



Watch the video interview here:



A man with short, light-colored hair is sitting in a brown leather office chair. He is wearing a dark pinstriped suit jacket over a light blue button-down shirt. He has his legs crossed and is smiling at the camera. The background is a light-colored, textured wall.

“The world’s a bit of our oyster right now, and I like the way things are setting up from an energy transition practicality approach.”

that's what we like to see in midstream."

Ebel probably does not mind that description of the company and its lack of sex appeal, personally likening Enbridge to FedEx.

"We'll pick up your product, we'll store it, we'll ship it to you and then you'll be able to use it," Ebel said. "Maybe that doesn't give us as much [commodity] upside, but it doesn't give us as much downside, and that allows us to be a really great long-term investment. And we're comfortable with that."

But he is very bullish and excited about growth.

"We move 25% to 30% of all the oil and gas that moves in North America each and every day, and now we have the largest export facility on the Gulf Coast for liquids," Ebel said. "And now we're attached to five or six LNG facilities on the Gulf Coast. And now we're actually building an LNG facility off the West Coast of Canada with our partners."

Just last year, Enbridge invested \$1.5 billion, including a 30% stake, in the Woodfibre LNG project in British Columbia to mark Enbridge's first direct investment in LNG export facilities. The potential remains for further direct LNG investments in western Canada and the U.S. Gulf Coast, he said. The move came with Enbridge also planning to spend well more than \$2 billion to expand the length and capacity of its T-South Pipeline system from the Montney shale gas supplies to Vancouver and, ultimately, to the Woodfibre facility once the LNG project comes online in 2027 as planned.

The Woodfibre facility is touted as the lowest-carbon LNG project in North America because it would use clean hydropower electricity to power its operations.

In 2021, Enbridge became the top U.S. crude exporter when it bought Moda Midstream and its Ingleside Energy

CLOSER LOOK

Notable new Enbridge projects from the past 12 months:

- Open season to add 95,000 bbl/d of capacity to Flanagan South crude pipeline
- \$240 million to build new Enbridge Houston Oil Terminal with 2.5 MMbbl of crude storage capacity
- \$335 million to acquire Tres Palacios gas storage caverns in South Texas with 35 Bcf of storage
- \$80 million for 10% stake in Divert Inc. food waste-to-renewable natural gas business
- Acquired additional 10% stake (now a 68.5% stake) in long-haul Gray Oak crude pipeline from Permian
- Acquired additional 10% stake (now a 30% stake) in long-haul Cactus II crude pipeline from Permian
- Partnered with Occidental Petroleum to develop carbon capture sequestration hub near Corpus Christi
- \$1.5 billion investment, including 30% stake, in Woodfibre LNG project in British Columbia
- Brought online the Saint-Nazaire Offshore Wind Farm in France
- Expanding storage capacity at Ingleside Energy Center crude export hub
- \$270 million to acquire US wind and solar developer Tri Global Energy
- \$2.6 billion to expand T-South gas pipeline network in British Columbia by 300 MMcf/d
- \$400 million for Venice Extension and Gator Express Meter projects to service Plaquemines LNG
- Partnered with Humble Midstream for low-carbon hydrogen and ammonia projects near Corpus Christi

Center by the Port of Corpus Christi in South Texas for \$3 billion. Ingleside can currently export more than 1.5 MMbbl/d with plans to grow to nearly 2 MMbbl/d as more barrels flow from the booming Permian Basin and the steady Eagle Ford Shale. Enbridge is taking over control now of the long-haul Gray Oak Pipeline from the Permian to Ingleside after buying a controlling stake as well.

Enbridge even succeeded where the politicized Keystone XL pipeline project from TC Energy failed. Enbridge's lesser-known Line 3 Replacement project carried a more boring name but actually came online in late 2021, effectively ending the longstanding heavy oil pipeline bottleneck into the U.S. The Biden administration tacitly approved of it by ignoring it.

The roughly eight-year-old, \$4 billion project successfully doubled Line 3's crude capacity from 370,000 bbl/d to 760,000 bbl/d from Alberta to Superior, Wis. Despite waves of lawsuits and environmental protests and hundreds of arrests, the project still flew relatively under the radar compared to the Keystone XL plans.

With Line 3 as part of Enbridge's huge Mainline oil network, the broader system now ships a record high of 3 MMbbl/d stretching almost 8,600 miles from the Canadian oil sands near Edmonton to the U.S. Midwest and Ontario. From the Midwest, the expanding Flanagan South and Seaway pipeline systems move the crude to the Texas Gulf Coast for refining or export.

The successful Line 3 fight, Ebel said, highlights the importance of having so many assets already in the ground. It is much easier to expand than to build from scratch.

"It was a replacement of an existing line. That's brownfield versus greenfield," Ebel said. "Not that it was easy to get sited. We spent a long time doing it. But it's a darn way easier than doing everything greenfield. In a strange way, given how long it took and all the effort we had, I think it actually underlies the importance of brownfield projects."

A 'bicultural' history

Initially founded in 1949 as part of Imperial Oil in Canada and named the Interprovincial Pipe Line Company, IPL grew throughout the 20th Century but did not switch to the "Enbridge" name until 1998.

Enbridge carries a long history with just a 25-year-old, Generation Z name.

But Enbridge did not firmly solidify itself as North America's top midstream player until just six years ago with the acquisition of Houston-based Spectra in a \$28 billion, all-stock deal. And Enbridge has only grown from there.

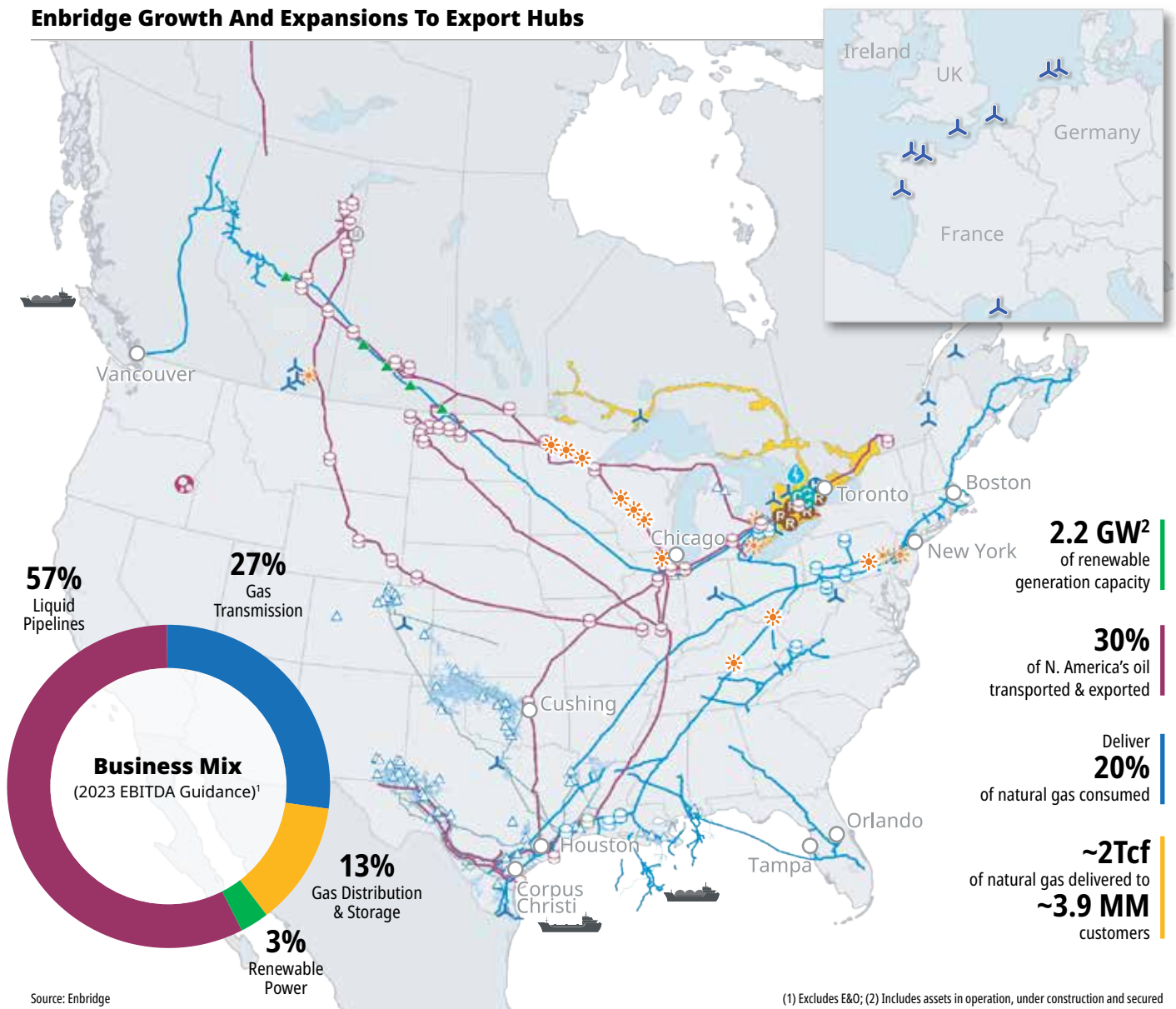
As the CEO of Spectra, Ebel negotiated the deal with recently retired Enbridge chief executive Al Monaco. Ebel stepped into the non-executive chair role at Enbridge in 2017 and stayed there until replacing Monaco on Jan. 1. Monaco spent 27 years at Enbridge and retired at the end of 2022 after nearly 11 years as CEO.

Ebel, 58, acknowledged it is "unusual" to—years later—take over the company that acquired his own. One factor, he said, might be his relative youth as a 40-something CEO previously at Spectra.

"Al and I worked very closely with the management team here creating this strategy, so we're hand-in-glove in producing that," Ebel said. "It's a bit of a unique situation but obviously one the board felt was the right way to go, and I was thrilled to assist when asked."

A native of central Canada, Ebel considers himself "bicultural" as a dual citizen who has spent much of his career in the U.S. He studied economics and public policy

Enbridge Growth And Expansions To Export Hubs



at York University in Toronto and worked with the Canadian government, the World Bank and the International Finance Corp. before finding his way into the energy sector. During this time, he helped work on the privatization of Petro-Canada and saw firsthand some of the bureaucratic inefficiencies of government control, he said.

"I learned a ton from the government and how hard it is to get policy or get anything done. That's been really valuable," he said.

In fact, in his most recent earnings call while complaining about pipeline permitting issues, Ebel said the biggest impediment to growth is government, not prices: "Permitting, permitting, permitting, not commodity, commodity, commodity." Canada and the U.S. East Coast stand out the most.

While working with the World Bank though, Ebel crossed paths with and then decided to join Westcoast Energy, a Canadian pipeline company that came from Petro-Canada that was then doing some business with him in Indonesia.

In 2002, U.S. utility giant Duke Energy acquired Westcoast—and Ebel.

Then came the Enron scandal and the ripple effects of many utility and pipeline companies decoupling. Ebel was

leading Duke's mergers and acquisitions operations. But, in 2007, Duke spun out the gas transmission business as the brand new Spectra Energy.

Ebel started out as Spectra's first CFO but, just over a year later amid the financial crisis, he was named CEO. "It's one of those things where crisis breeds opportunity," he laughed.

While the crisis was tough on the sector, the timing also coincided with the shale boom. "We continued to grow during that very difficult time," he said.

In just a decade of existence, Spectra built about \$20 billion of pipeline and storage projects in Canada and the U.S., specifically the Northeast, Appalachia and Texas.

Having known Monaco dating back to his Westcoast days, they continued to have conversations. Eventually, a deal was struck. "These things—for a deal of that size—take a lot of discussions over a lot of years.

"It was a very solid deal—a true win-win—which you don't always see," Ebel said. "It was 100% equity, so no one was adding any debt. It was a relatively low premium, but both companies—if you think about everything that's happened since 2017—have really been able to do better than they would have done alone. Going forward, we're just accelerating that further."



“I think you find the public outside of North America are really knocking on the door to say, ‘You guys have so much energy in North America—plenty to fuel your own future. But we need it, and we need it more than ever thanks to what’s been going on in Europe. So, please, deliver it.’”

Arnaldo Larios

Embracing the transition

Enbridge’s acceleration includes new projects announced as recently as March.

Enbridge will build upon its U.S. crude oil artery by aiming to add 95,000 bbl/d of capacity to Flanagan South, carrying more crude to export south of Houston.

As such, \$240 million is newly dedicated to build a new Enbridge Houston Oil Terminal with 2.5 MMbbl of crude storage capacity with the potential to expand up to 15 MMbbl.

Enbridge still has a noncontrolling partnership with Enterprise Products to build the first deepwater, crude-exporting hub offshore Texas, the Sea Port Oil Terminal, called SPOT. The terminal is proposed to be built about 30 miles offshore of Freeport, which is due south of Houston. The deeper water depths offshore are needed for very large crude carriers to load up to capacity. SPOT could load 2 MMbbl/d, handling two very large crude carriers simultaneously.

As for LNG, Enbridge just bought the Tres Palacios gas storage hub west of Freeport for \$335 million, specifically to help service LNG facilities along the U.S. Gulf Coast with 35 Bcf of storage across three nearby caverns.

And that leads us more into the energy transition as Enbridge continues to lean into renewables, carbon capture and storage, and hydrogen projects. Enbridge just spent \$80 million to buy a 10% stake in Divert Inc. as the company pledged to spend \$1 billion to expand the food waste-to-renewable natural gas facilities.

“Renewable natural gas—let’s not forget about that,” Ebel said. “Moving things like food waste into renewable natural gas and blending that into the systems—both in homes but also into our mainline systems.”

As for renewable energy, Enbridge last year bought the U.S. wind and solar developer Tri Global Energy. In November, Enbridge partnered to bring online the Saint-Nazaire Offshore Wind Farm, the first wind project offshore of France. Enbridge now has wind farms in France, Germany and the U.K., apart from the U.S. and Canada.

Next up, Ebel said, are carbon capture and hydrogen projects. The Inflation Reduction Act is better incentivizing U.S. projects, while the Canadian government is making headway, but not quite there yet, he said.

Enbridge is partnering to develop a low-carbon hydrogen and ammonia production and export facility at Ingleside. And, more recently, Enbridge teamed up with Occidental Petroleum Corp. to develop a carbon capture sequestration hub in the Corpus Christi area.


West of Edmonton, Enbridge is developing the Open Access Wabamun Carbon Hub with partners.

Citing the fairy tale, Ebel said, “It’s a bit of a Goldilocks world”—a mix of oil and gas solutions for near-term challenges and greater incentives for longer-term renewable energy options.

Essentially, the world needs an energy porridge smorgasbord of hot, cold and just right.

If anything, Ebel said, Russia’s invasion has seemingly ensured that “the world is now focused on a practical energy transition as opposed to a perfect energy transition.” That means saying all-of-the-above energy solutions and really meaning it.

From Ebel’s perspective, Enbridge is perfectly positioned to answer the call on all of those fronts.

“The world’s a bit of our oyster right now, and I like the way things are setting up from an energy transition practicality approach.” 

CEO PREDICTIONS: TIGHTER OIL MARKET IN 2023, PERMIAN 'PLATEAU' THIS DECADE

Hess Corp. CEO John Hess said investment in oil and gas and clean energy hasn't kept up with growing demand, while ConocoPhillips Co. CEO Ryan Lance said the Permian will probably plateau later this decade.



CHRIS MATHEWS
SENIOR EDITOR, SHALE/A&D
@chrismathews52
cmathews@hartenergy.com

After volatility in crude oil prices in 2022, Hess Corp. CEO John Hess expects the global oil market to move tighter later this year.

ConocoPhillips Co. chairman and CEO Ryan Lance sees a longer-term problem: The U.S. will likely have to cope with flattening production in the Permian Basin later this decade.

Both CEOs shared the stage in March during an oil and gas panel discussion at the CERAWEEK by S&P Global conference in Houston.

Hess sees signs that 2022 was a prelude to continued market volatility this year.

"I think you're going to make a tight market tighter," Hess said. "I think [2022] was a warning, but I don't know that we're any more prepared now."

WTI crude prices reached levels over \$120/bbl last summer but had erased most of their gains by December 2022, when prices bottomed out around \$71/bbl.

Rising interest rates and COVID-19 lockdowns in China can be blamed for pushing down demand, Hess said.

Global gas markets faced severe disruptions after Russia's invasion of Ukraine, but barrels of Russian crude continued to find their way to market despite international financial sanctions. Although Russia cut crude production, Russian crude exports have outpaced U.S. expectations, according to Energy Information Administration (EIA) data published on March 7.

But several factors make Hess bullish on oil through the rest of 2023, including the reopening of the Chinese economy, increasing global travel and U.S. crude production growing at a slower rate, by about 500,000 bbl/d this year.

Hess maintains that there's been an insufficient level of investment in oil and gas, as well as clean energy resources, to keep up with growing global demand.

"There actually is a structural supply deficit when it comes to energy supply, both for new energy and for oil and gas," Hess said. "And the world needs to wake up to this."

The EIA anticipates WTI spot prices to average around \$78/bbl through the first half



CERAWEEK by S&P Global

"I think it's one of the issues the U.S. is going to grapple with. [The Permian] probably does start to plateau later this decade."

—Ryan Lance, ConocoPhillips

of 2023 before falling to \$75.35 in the fourth quarter.

Permian's plateau on the horizon?

Of the roughly 500,000 bbl/d U.S. production increase this year, the vast majority is expected to come from the Permian Basin of West Texas and New Mexico.

While the Permian has been a prolific resource for oil and gas operators for more than a decade, production in the region is beginning to show signs of plateauing, Lance said.

"I think it's one of the issues the U.S. is going to grapple with," Lance said on the panel. "[The Permian] probably does start to plateau later this decade."

Supply chain constraints, labor shortages and rampant inflation continue to present challenges to companies in the Permian, Lance said.

INVESTOR PROFILE: BRAD THIELEMANN, ENCAP INVESTMENTS

Private equity veteran Brad Thielemann considers the role of private equity in traditional oil and gas investing as well as its trajectory for financing the transitions ahead.



DEON DAUGHERTY
EDITOR-IN-CHIEF

@Deon_Daugherty

ddaugherty@hartenergy.com

Privately backed operators are such a force in the U.S. oil and gas business that trends within that space can foreshadow trends ahead for the entire industry. And with more than three decades as a lead investor in many of the ventures that have made it happen, EnCap Investments' portfolio features a veritable "who's who" of success stories.

With almost 20 years at EnCap, partner Brad Thielemann has insight into the road ahead. He spoke recently with Oil and Gas Investor's editor-in-chief, Deon Daugherty, about private equity's evolving dynamic and just how much the story may remain the same.

Deon Daugherty: Much like the "cyclical" nature of the energy industry itself, private equity has its own rhythm. The "buy and flip" model has shifted now to more of a "hold and develop" strategy; what does that tell us about the trajectory?

Brad Thielemann: The one thing about private equity that really hasn't changed is that the structure allows us and our teams to make quick decisions and to be nimble from an economic standpoint as the market changes.

Private companies are running over half of the rigs in the U.S. today. The role of private companies and private equity is as important as it's ever been. We're running around 30 rigs in our portfolio at EnCap, making us one of the more active operators on an aggregate basis.

The model of how we capture and then develop assets has changed. The "buy and flip" model in the upstream space made sense when the market rewarded resource expansion, and buyers were willing to pay for opportunity sets heavily weighted to upside potential. The market has obviously evolved dramatically over the past few years.

As the market shifted, our investment strategy and business plans did as well. We're generally developing assets longer. We're trying to build businesses that have scale, free cash flow and quality inventory. But some things haven't changed—backing the best people and trying to

find opportunities that generate the best risk-adjusted returns. We believe we can generate attractive returns through large-scale, economic development programs and create assets that today's buyers are seeking. We think the private equity survivors, as we call them, are going to see good opportunities for many years to come, particularly for those that can buy and operate at scale.

DD: Undercapitalization within the traditional energy space is an ongoing theme, but we're also seeing some concern lately about lacking investment within the transition resources space. How might private equity fit in meeting those demands?

BT: As we step back and look at the opportunities that are in the transition, a massive amount of capital is going to be required over decades. Private equity may be just a piece of that, but we do see significant opportunity.

We partnered with a dedicated investment team back in 2019 that had extensive experience in the space and was exclusively focused on opportunities in energy transition. They have built an exciting portfolio and backlog of opportunities today. We thought it was critical to partner with individuals who had spent the vast majority of their careers in energy transition, and we've seen the benefits of their expertise and relationships to attract strong management teams, generate deal flow and





“At the end of the day, we think it’s a strong investment environment, and capital is going to need to flow back to the E&P sector.”

navigate what is an exceptionally dynamic and growing market.

DD: When it comes to meeting global demand, there are dozens of estimates for just how much energy investment is needed—and profoundly lacking—particularly in traditional energy. Why do you think these disparities persist?

BT: We do think the underinvestment in the traditional part of the energy business is real. Just looking at historical upstream investment, there was a period of massive capital spend at the turn of the last decade with high commodity prices and easy access to capital. A few years ago, we saw investment slow and the narrative shift to capital discipline. There is now a big shortfall in upstream spending worldwide, with projections showing we need to spend almost 50% more than we are currently spending to meet demand over the next decade. So there’s a big shortfall, and it’s going to create some macro challenges, as well as opportunities, going forward.

During the U.S. shale boom, there was a “growth at all costs” mindset and access to public and private capital was easy to come by. In a lot of cases, capital was poorly allocated and returns were bad, and there is still scar tissue for certain investors despite the fact that energy has been one of the best performing sectors the last two-plus years. ESG concerns are another hurdle and some investors will never support hydrocarbons again even though affordable, reliable energy is critical and beneficial for the world. With everything happening over the last year with Russia and Ukraine, the conversation has shifted some, but there is still a lot of capital that hasn’t flowed back into the system.

From a private equity standpoint, many of the large traditional or generalist firms have exited our space. Even though private equity is a relatively small piece of the puzzle, the contraction of that capital has implications for our industry. For those with access to significant capital today, there are some really good risk-adjusted opportunities.

At the end of the day, we think it’s a strong investment environment, and capital is going to need to flow back to

the E&P sector. Hopefully strong returns will be hard to ignore and some capital will flow back to the space, but it probably won’t compare to what we saw in prior decades.

DD: What does the global emphasis on energy transition mean for longtime private equity players like EnCap that have largely led the placement of private funding for traditional oil and gas?


BT: It’s a good question. We’re big believers that we’re going to need an “all of the above” approach to meet growing energy demand and that the energy transition will take a very long time. But oil and gas is critical and will remain the backbone of the global economy for decades.

All we do at EnCap is energy. We are in a dynamic and important industry, and we’ve seen a lot of change in our space in the last 30-plus years. We know change will continue and that oil and gas will remain important, and that we’ll continue to try to find great opportunities in this long transition.

DD: Have these dynamics changed your strategy in the sense of actual locations or parts of the world in which EnCap wants to invest?

BT: Economics are going to drive all of our investment decisions on where to invest. Substantially all of our recent capital has been deployed in the Lower 48. This is driven by our view of risk-adjusted economics, as well as where we have our relationships and what we view as our strengths as a firm. We still see great opportunity in the U.S., and I don’t expect that to change soon.

We’re currently invested in almost every major onshore U.S. basin—the Permian is a major focus, but we have teams in Appalachia, the Bakken, the Eagle Ford, the Haynesville, the Midcontinent, the San Juan and the Uinta. We have actually done three large acquisitions in the last two years,

and all of those were outside of the Permian. About half of our approximately 30 rigs are running the Permian, but the rest are spread out across those other basins where we like the development economics. In general, we’ve found that partnering with the right teams on the right assets is a great equation to create value and be successful. 

“We do think the underinvestment in the traditional part of the energy business is real.”

“As we step back and look at the opportunities that are in the transition, a massive amount of capital is going to be required over decades. Private equity may be just a piece of that, but we do see significant opportunity.”

CHESAPEAKE LNG DEAL MOVES ITS HAYNESVILLE GAS CLOSER TO GLOBAL PRICE

In an LNG deal, up to 100 Bcf/year of the operator's Haynesville production will be indexed to the Japan Korea Marker.



NISSA DARBONNE
EXECUTIVE EDITOR-AT-LARGE

[@NissaDarbonne](#)

ndarbonne@hartenergy.com

Chesapeake Energy Corp. has moved closer to getting overseas pricing for its Haynesville Shale gas, signing a heads of agreement (HOA) on nearly 100 Bcf/year for 15 years beginning in 2027. Chesapeake's deal is with commodities trader Gunvor Singapore Pte Ltd. and has Chesapeake's Haynesville gas price indexed to the Japan Korea Marker (JKM), according to Chesapeake's announcement.

And there could be more deals, according to Nick Dell'Osso, Chesapeake president and CEO. "... We look forward to entering into additional agreements while export capacity continues to come online."

Chesapeake has been waiting to win an investment-grade credit rating to commit to a firm LNG supply contract.

"Chesapeake jumps to the head of the queue among gas independents seeking vertical integrated exposure to global LNG markets," Subash Chandra, analyst for Benchmark Co., wrote about the agreement.

Upon consummation, Chesapeake will join Devon Energy Corp. and EOG Resources Inc. in direct-sales contracts for a premium price.

Chandra noted that the independent has been teeing up for this next step.

"Chesapeake has the gas, firm transport to the LNG corridor [and] an agreement with a global LNG marketer."

The delivery start is targeted for 2027. It and Gunvor are now looking at LNG facilities at which Gunvor will receive the gas via a "free on board" basis, the two companies reported.

Chandra wrote, "Chesapeake may use their assets to push a pre-FID [final investment decision] LNG project across the finish line. They could also take an equity interest in the facility on a pre-FID basis."

He noted that several—estimated at up to six—LNG projects are anticipated to make their FID this year and "several are delayed, so there are many candidates."

It might not be exciting news, he added. "The market may not care right now because 2027 is out there, JKM prices are 50% below year-ago levels and [negative] general gas sentiment.

"But Chesapeake's pole position should ultimately pay off with JKM exposure and monetization of any LNG stake," he concluded.

Dell'Osso said that the "agreement reflects the powerful combination of the premium



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rock, returns and runway of our competitively positioned Haynesville natural gas assets, combined with the strength of our balance sheet and financial position to securely supply global LNG markets.”

Haynesville LNG advantage?

Matt Portillo, analyst for Tudor, Pickering, Holt & Co. (TPH), wrote that it was “good news to see, in our view, as there has been a lot of discussion around upstream participation in global LNG contracting but few deals to show so far for pure-play gas producers.”

What’s been the impediment? “In our view, some of the limiting factors to get deals across the finish line in U.S. upstream have been location of resource—[as] significant low-cost Northeast U.S. inventory remains constrained by pipe—[and] credit quality and the scale of counterparties—[that] precludes most private operators and smaller publics.”

And there is this hurdle too: “Inventory depth to underwrite 10- to 15-year contracts from the Haynesville [is] a constraint for a number of producers in the Haynesville.”

Like Chandra, he liked the deal. “[It] validates the counterparty- and resource-quality boxes for Chesapeake in our view, and continues to position the company to benefit from a diversified marketing portfolio longer term.”

Meanwhile, Chesapeake continues to work on reaching an investment-grade credit score, according to Mohit




“Chesapeake jumps to the head of the queue among gas independents seeking vertical integrated exposure to global LNG markets.”

—Subash Chandra, *Benchmark Co.*

Singh, CFO. “We remain actively engaged with the rating agencies,” he said in the company’s earnings call Feb. 22.

The \$1.7 billion in after-tax cash it receives upon closing the sale of two of its three Eagle Ford portfolios, plus an additional \$450 million in a few years is “considered positive from the rating agency perspective,” he added.

“Overall, what they need to see is just some more seasoning and time, and financial policy and financial discipline, which we continue to demonstrate. They like all of that,” he said.

“It’s just more a matter of time and continued engagement. And we remain confident it’s a matter of time until we get to investment rate.” 

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TRINIDAD'S ENERGY MINISTER TALKS GAS PRODUCTION, VENEZUELA AND ATLANTIC LNG

Trinidad and Tobago's Minister of Energy and Energy Industries Stuart Young discusses gas production and bid rounds, as well as capturing Venezuelan flared gas and the restructuring of Atlantic LNG.



PIETRO D. PITTS

INTERNATIONAL
MANAGING EDITOR

@PietroDPitts

pdpitts@hartenergy.com

Trinidad and Tobago's Minister of Energy and Energy Industries Stuart Young spoke with Pietro D. Pitts, Hart Energy's international managing editor, at CERAWEEK by S&P Global in March. Young discussed the government of the twin-island country's lease sale bid rounds, incentivization efforts to stop declining gas production, exchanges with Venezuela regarding tapping gas from the Dragon Field and the restructuring of Atlantic LNG.

Pietro D. Pitts: Where is Trinidad's gas production today and how are developments aimed at boosting production advancing?

Stuart Young: Trinidad is currently at about 2.8 Bcf/d in terms of production. We have a number of projects online and a number coming onstream. For example, BP's Cassia compression and the Matapal projects [and] Shell's Barracuda and Colibri [projects have come online]. We have EOG Resources doing other [project-related work to boost production]. We have some onshore production that's going to come on hopefully in the middle of this year from Touchstone [Exploration]. I expect us to hold the 2.8 Bcf/d and maybe we'll go up to about 3 Bcf/d and just stay there, level, hopefully for a while as other projects start to come on. One of the big ones we're working with Shell [with] is the Manatee project ... of course Loran-Manatee. You have a number of things that are onstream, and I'm also looking at marginal fields. "How could we get some of the marginal fields produced where there's some smaller production?" The good news is you have EOG ... prepared to do sidetrack drilling to get to some smaller pools of gas. [Trinidad's] government is ready and on standby to speak to [the] industry about what commercial and fiscal terms they need to progress because our attitude is every molecule of gas is a molecule we could use.

PDP: Has Trinidad implemented the necessary fiscal terms to attract investments from energy companies?

SY: Absolutely, but right now you're not finding major IOCs [international oil companies] going into new territories. We're very fortunate that we have BP, Shell and Woodside out of Australia who are doing deepwater appraisals right now.

We're actually in the middle of negotiations with them on commercial terms because when we get the deepwater province in Trinidad produced, that's going to be significant. That's our next big significant set of gas production. So the truth is I don't think you're going to have any main major players making moves to new jurisdictions and provinces.

So that's one of the things that I think we are always cognizant of. And what we've done over the last six years [is to say] to the players, 'Come and speak to the government.' We're willing to look at PSCs [production-sharing contracts]. We renegotiated with Shell, for example, the Manatee PSC. We've been speaking to BP and gave them extensions on about 92 E&P licenses, and that's what got Cassia across the line and Matapal. Recently when I and the prime minister met with BP in London, [CEO Bernard] Looney said, "Look, go ahead," and he sanctioned the Cypré project.

What we're prepared to do is sit down, discuss and negotiate fiscal terms and the contractual terms on the fiscal side, which is the taxation side. We are there, but we continue to review it. The minister of finance and myself are currently reviewing the fiscal terms to see if there are any more incentives or things that can be done that would spur on more production. And of course we're very protective with the revenue for the people of Trinidad.

PDP: You've had onshore, nearshore and offshore bid rounds recently. Could you give us an update on how that's gone?

SY: On the onshore and the nearshore bid rounds, it was 11 blocks. We had 16 bids come in. So you have about eight blocks where there's competition. Right now, they're being evaluated by the ministry, and I've told them they must



“[Trinidad’s] government is ready and on standby to speak to [the] industry about what commercial and fiscal terms they need to progress because our attitude is every molecule of gas is a molecule we could use.”



Jordan Soto/Hart Energy

Trinidad and Tobago’s Minister of Energy and Energy Industries, Stuart Young spoke with Hart Energy’s international managing editor, Pietro D. Pitts, about gas production and bid rounds, as well as capturing flared gas and the restructuring of Atlantic LNG.

stick to the three-month deadline that I’ve given. They recently assured me they’re on track and going to bring it to me shortly, and I am going to go to Cabinet within that three-month period with recommendations as to who we should award these blocks to. And I’m very excited that it’s going to increase our oil production. But I’m also hopeful some of those onshore blocks may have some significant gas finds as well.

PDP: Trinidad at one point produced over 4 Bcf/d. Do you think what you’ve signed thus far and going forward can get you back to that mark, or is Venezuela really the only viable way to get there again or even beyond?

SY: To get back up to 4 Bcf/d, we are a declining province, and I think people need to understand that. I just came out of our plenary session where the chairman and president of ConocoPhillips was talking about the Permian Basin and how even that is going to go into decline and plateauing by the end of this decade. So I’m conscious of that in Trinidad.

The two big projects we have now that are going to maintain us and hopefully take us upward of 3 Bcf/d are Manatee with Shell and deepwater production with Woodside. Outside of that, yes, the cross-border gas and the Dragon Field, for example, are what are going to push the production up significantly. So we’re working assiduously on that. Those are the types of big projects that are going to not only arrest decline but send you back up significantly.

PDP: How have negotiations with Washington and Caracas gone recently about working with Venezuela’s state-owned PDVSA on getting that Dragon Field gas to Trinidad?

SY: We spent a lot of time during 2022 having discussions with the U.S., Europe and Venezuela. I want people to understand we in Trinidad have always maintained open channels of communication and a close relationship with the government of Venezuela. They are 7 miles off our coast and therefore our closest neighbor. In January of this year, we succeeded with our OFAC [U.S. Office of Foreign Assets Control] application. We’ve gotten a license to pursue the development of the Dragon gas field that will allow us to produce the gas, export it to Trinidad to produce commodities in our plants in Trinidad. We are currently in discussions with Venezuela, and I’ve already had two sessions with the highest level of the government and [will return] shortly and continue those discussions. I have to say the discussions are going very well. We have a good relationship with the government, and I expect us to find the right terms

and conditions ... to produce that Dragon gas.

PDP: Venezuela flares around 2 Bcf/d in its eastern region. The idea has been floating for a while about capturing that gas and transporting it to Trinidad. Is that something that Trinidad is still contemplating?

SY: That is absolutely something that we are discussing. So it’s not only [to] think about, but that is part of my conversation with Venezuela. But we need to take it one step at a time.

I think if we manage to do such a project, obviously it helps because some of the gas will be left in Venezuela for domestic use. But the export of gas to Trinidad where you have existing infrastructure that can monetize the gas in global commodities is of significant and tremendous value both to Venezuela and Trinidad. But then also the environmental side ... if we manage to capture that and utilize it, then it’s a win-win for everyone.

PDP: Atlantic LNG has been without Train 1 for almost a year now. How have talks gone with BP, Shell and other shareholders about a restructuring of the plant?

SY: The good news is we had the agreement on all of the commercial terms for the restructuring. So as far as we are concerned, the restructuring exercises were right. Now what we’re doing is all the entities ... that’s NGC [National Gas Co. of Trinidad and Tobago], BP, Shell and the government, and our lawyers are working together to come up with the definitive agreements. We’ve set ourselves a timeline of the first quarter of this year. Right now, we’re in the middle of those discussions with the lawyers trying to finalize these definitive agreements. And I’m hoping that we will be able to stick to the timelines. We have a few weeks overlap into April, but it’s looking good. So we would have completed the restructuring of Atlantic LNG, which is again, a tremendous achievement because it’s never been done anywhere else in the world.

PDP: When we talk about your other neighbors, Guyana and Suriname, Guyana maybe has 17 Tcf of gas offshore. Are there any discussions ongoing about potentially capturing that gas?

SY: What you can see is an open source that the prime minister and myself have been developing very good relationships with the governments of both Guyana and Suriname. I myself have been having [a] discussion for a while now about CARICOM integration and us working together as a region: Trinidad, Guyana and Suriname. That is part of any conversation you would expect in an evolution toward that. But right now, [the conversation] is,

"How can we help our CARICOM sister countries as they are having hydrocarbon finds? How can we help them with what we have learned being in this business for over 100 years on the exploitation of oil and decades in the utilization of gas?" So we are having very good conversations. We have a close relationship, and we stand by ready to assist them and help. But yes, there must be conversation about the development of gas.

PDP: When you talk about renewables, I know Lightsource BP has a project offshore Trinidad. Can you talk about that and how that's moving forward?

SY: Toward the end of last year, [we] signed on to a 112.2-megawatt solar project, and that is actually a consortium of BP and Shell with Lightsource BP being the ones who are going to get it done for us. We are going to take a stake in it as well, meaning the government of Trinidad through our NGC Group. So that is on the stream, and I'm hoping that you're going to see at the beginning of April the breaking of ground to start construction. That's the first huge step. It's going to be the largest renewable solar project and in particular in the English-speaking CARICOM region. And that's going to be a start. I'm hoping very shortly after to work with some RFPs [requests for proposals] to see if we can have more solar farms in Trinidad. But as I said, we're also going to be pursuing the wind-generated electricity through the wind turbines as well.


PDP: How has the Russia-Ukraine conflict impacted your exports of LNG, methanol and ammonia? Have you gotten better prices for the exports due to conflict?

SY: Well, I think global commodity prices in 2022 went to some very, very high highs. We've seen it sort of level back out now

in the first quarter of 2023. So obviously, whatever the global commodity prices are, we would either benefit from it when they're high prices or we will take some cuts when they are low prices. So we benefited from the price side, as you know, and as you started the conversation here this afternoon, production in Trinidad has declined. We've managed to stabilize at about 2.8 Bcf/d. So, obviously as much of that gas that we can convert into these commodities, the better for us.

We're also looking at energy efficiency and reduction of use of gas for production of electricity, not only through the renewables side, but also making all our grid and the production of electricity using gas more efficient by moving all of our plants, etc., to what is a combined cycle. That is also something I'm pursuing, and hopefully we'll be able to do because there can be significant savings of molecules and scuffs of gas there that can then go into conversion to commodities.

PDP: What would your final comment be to a potential investor looking at the volatile Latin American region about investing in Trinidad and why now?

SY: Trinidad has shown over decades there is a great deal of stability. So not only are contracts respected, we will have respectful conversations, but there's also existing infrastructure. So as we move through this energy transition, we have the infrastructure for shipping. All of the petchem plants, save one, are in one industrial estate so we can combine together with the carbon capture and reduce costs through economies of scale. In other words, Trinidad and Tobago has all of the right boxes to tick to keep us competitively advantaged in a good space, and that's exactly what we're going to work toward. 



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OFFSHORE PRODUCERS MAKE THE MOST OF EXISTING ASSETS

Net-zero carbon targets are at the top of many oil and gas company agendas, and subsea tiebacks are increasingly giving them the opportunity to reach those targets using existing infrastructure and innovative technology.



JAXON CAINES
TECHNOLOGY REPORTER
jcaines@hartenergy.com

Offshore producers have relied on subsea tiebacks to connect new discoveries to existing infrastructure for decades. This engineering phenomenon picked up steam in recent years to save time and, crucially, money, in the process of bringing new production online.

But the emergence of emissions reductions as an existential necessity within the energy industry has given subsea tiebacks an additional impetus.

They can get the job done of adding production faster, cheaper and cleaner.

Tiebacks can give offshore producers new access to pockets of oil and gas that might otherwise remain undeveloped, said Aasha Marengi, a subsea hardware project manager at bp.

"We can connect them to existing facilities, we can reduce our capital expenditure, extend an asset's life, help to retain jobs and keep our environmental footprint to a minimum," said Marengi, who has led project performance in the North Sea and offshore Angola.

Subsea tiebacks can contribute to production in the harshest of environments, although planning for them still remains a lengthy and expensive process.

But, similar to the innovations onshore enabling shale operators to accelerate the speed and volume of their production, offshore companies are finding technology to streamline their subsea tiebacks for both efficiency and efficacy, analysts report.

Indeed, some companies have managed to reduce planning and development time by half, bringing these projects to fruition in as little as two years instead of the more traditional five-year window.

Here is a sampling of select subsea tieback projects from around the world.

NORTH AND NORWEGIAN SEAS

The North Sea is dotted with extensive infrastructure in both deep and shallow water. The Oil and Gas Technology Centre has estimated that some 2.5 Bbbl could yet be developed using subsea tiebacks in the region.

Berling

OMV Norge has submitted the Berling Field plan for development and operation to Norway's Ministry of Petroleum and Energy.

In December 2022, OMV and its partners decided to invest \$921 million to develop Berling Field, formerly called Iris Hades, in the Norwegian Sea 12 miles from Åsgard Field. The field sits in 918-ft water depth and stretches across the PL644, PL644B and PL644C licenses, which have aligned ownership interests.

The development concept calls for a four-slot subsea template with three producing wells tied back to the Equinor-operated Åsgard B platform. The rich gas will be processed on Åsgard B and transported via the Åsgard Transport System for

further processing at Kårstø gas processing plant. The condensate will be transferred to Åsgard and comingled with other Åsgard production for storage and export by shuttle tankers to the market.

Estimated recoverable resources are 45 MMboe, and production is expected to start in 2028.

OMV Norge has signed a contract with TechnipFMC for the FEED for the subsea production system. OMV Norge also awarded a four-year frame agreement to Baker Hughes for integrated well construction and completion services for the three production wells.

OMV also partnered with Wintershall Dea to jointly award a drilling contract to Transocean in September 2022. OMV will have exclusive use of the Transocean Norge semisubmersible.

OMV (Norge) AS operates the field with 30% working interest on behalf of partners Equinor, with a 40% stake, and DNO Norge with 30%.

Dvalin North

In December 2022, Wintershall Dea and partners Petoro and Sval Energi submitted the



Top North Sea Projects

Project name	Country	Block/PL	Water depth (feet)	Status	Onstream	Operator
1. Berling	Norway	PL644, PL 644 B, PL 644 C	918	Sanctioned	2028	OMV Norge
2. Dvalin North	Norway	PL 211	1,378	Sanctioned	2026	Wintershall Dea
3. Evelyn	U.K.	PL 1792	310	Onstream	2022	Tailwind Energy
4. Irpa	Norway	6705/10-1	4,400	Sanctioned	2026	Equinor
5. Kristin Sør	Norway	6406/2-1	920	Sanctioned	2024	Equinor
6. Nova	Norway	PL 418	1,200	Onstream	2022	Wintershall Dea

Source: Hart Energy research; company reports

Dvalin North Field plan for development and operation to the Norwegian Ministry of Petroleum and Energy.

The Dvalin North gas field is located 120 miles off the coast of northern Norway in a water depth of 1,380 ft. The field, which was the largest discovery in Norway in 2021, holds an estimated 84 MMboe. The field will be tied back to the Heidrun platform via the existing Dvalin Field on the Norwegian Continental Shelf (NCS).

The Dvalin North partnership will commit around \$830 million to develop the discovery. Three producing wells will be drilled from a single subsea template 6 miles north of Wintershall Dea's Dvalin Field, which is expected to begin production in the coming months. Dvalin North is scheduled for start-up late 2026.

Aker Solutions won the contract to deliver the subsea production system, which includes three horizontal subsea trees and control systems, a four-slot steel subsea template with an integrated manifold system, three wellhead systems and all associated tie-in and installation work. The scope also covers 6 miles of static subsea umbilicals. Final deliveries are planned for late 2025.

Wintershall Dea also awarded an EPCI contract to TechnipFMC for the design, engineering, manufacture and installation of pipe.

Wintershall Dea operates the field with 55% interest on

behalf of partners Petoro with 35% and Sval Energi with 10%.

Evelyn and Gannet East

Tailwind's combined Evelyn Phase 1 development and Gannet East Expansion projects began first production in September 2022 as a subsea tieback to Dana Petroleum's Triton FPSO, 4 miles away in the U.K. Central North Sea.

Evelyn was originally discovered in 1984. Tailwind acquired the field from Shell as part of its acquisition of a cluster of assets in the Greater Triton Area in 2018 and submitted a field development plan in 2020. The North Sea Transition Authority granted approval in early 2021. FPSO owner Dana Petroleum contracted TechnipFMC to fabricate and install an umbilical riser, as well as two flexible risers on Triton and provide engineering, procurement, installation, and commissioning.

Evelyn Field sits in 311-ft water depth and was developed together with the Gannet East expansion project.

Tailwind holds 100% interest in Evelyn in license P.1792 in Block 21/30. Tailwind also has 46.42% equity in the Triton FPSO.

Irpa

Discovered in 2009, Irpa will be tied back to Aasta

Hansteen, which is currently the deepest field development on the Norwegian Continental Shelf of the North Sea.

Formerly known as Asterix, Irpa is located in 4,400 ft of water in the Norwegian Sea and holds estimated recoverable gas reserves of almost 700 Bcf, as well as 14 MMcf in condensates—or approximately 124 MMboe in all. The \$1.4 billion development, which will include three wells, is expected online in the fourth quarter of 2026 and will ensure activity and stable gas deliveries from Aasta Hansteen until 2039. Equinor submitted the plan for development and operation to Norway's Ministry of Petroleum and Energy in November 2022.

Saipem has the contract to install the pipeline. Saipem will install the 50-mile, swaged pipe-in-pipe pipeline connecting the subsea production template of Irpa Field to the existing Aasta Hansteen platform. Saipem's *Castorone* will carry out offshore operations in 2025.

A Subsea7 and DeepOcean consortium will handle the engineering, transportation and installation of a mono-ethylene glycol (MEG) pipeline, a production riser, umbilical, subsea structures and tie-ins. Operations are planned to take place over the next three years.

TechnipFMC will provide subsea production systems under a framework agreement. The contract covers the supply and installation of subsea trees, control systems, structures, connections and tooling.

Equinor operates the field with a 51% interest on behalf of partners Petoro with 20%, Wintershall DEA with 19% and Shell with 10%.

Kristin Sør

In June 2021, Equinor and its partners submitted the plan for development and operation of the Lavrans and Kristin Q discoveries as satellites to Kristin Field. This is the first phase of the Kristin Sør project, which is located off the coast of Norway in the Norwegian Sea.

The Kristin Q high-pressure, high-temperature discovery is located in the southern part of Kristin Field. The Lavrans discovery is located in 6406/2-1 license area,

approximately 6 miles southeast of the existing Kristin Field in a water depth of 920 ft. Discovered in 1995, the Lavrans was appraised with two appraisal wells.

Both Aker Solutions and TechnipFMC were awarded contracts for the project. Aker Solutions' contract includes a subsea template with four standardized vertical subsea trees for the Lavrans Center, as well as a manifold for Kristin Q Field. TechnipFMC was awarded an engineering, procurement, construction and installation contract for rigid pipelines, static and dynamic umbilicals, as well as pipeline and marine installation of the subsea production facilities.

Production for the \$735 million Kristin Sør project is planned to start in 2024. The expected production period is 11 years and expected recoverable reserves are 58 MMboe.

Equinor operates the field with 54.82% interest on behalf of partners Petoro with 22.52%, Vår Energi with 16.66% and TotalEnergies EP Norge with 6%.

Nova Field

Nova Field, which came onstream in the summer of 2022, was developed as a subsea tieback to the existing Gjøa platform in the North Sea offshore Norway.

Discovered in 2012, Nova is 10 miles southwest of Gjøa in a water depth of roughly 1,200 ft. The field in PL418 consists of two subsea templates, one with three oil producers and one with three water injectors, tied back to Neptune Energy's Gjøa platform. The host platform provides gas lift and water injection to the field and receives the Nova hydrocarbons.

Recoverable gross reserves from the field are estimated at 90 MMboe, of which the majority is oil.

In 2021, Saipem was awarded a contract for semisubmersible rig *Scarabeo 8* to finalize the drilling campaign for six wells in Nova Field.

Wintershall Dea operates Nova Field with a 45% stake. Partners include Sval Energi with 45% and Pandion Energy Norge with 10%. Wintershall also has a 28% share in the Gjøa infrastructure.

US GULF OF MEXICO

U.S. Gulf of Mexico (GoM) federal offshore oil production accounts for 15% of the nation's total crude oil production and 5% of its total dry-gas production, according to the U.S. Energy Information Administration (EIA). Amid the clamor to meet the burgeoning energy needs of Europe, the location is key for expected export trends. Currently, more than 47% of U.S. petroleum refining capacity is located along the Gulf Coast, as well as 51% of total U.S. natural gas processing plant capacity, according to EIA.

Ballymore

Chevron's Ballymore project is a \$1.6 billion development with the potential to recover more than 150 MMbbl of oil-equivalent resources in the Mississippi Canyon area of the U.S. Gulf of Mexico.

The project, sanctioned in May 2022, will be developed as a 3-mile tieback to Chevron's existing Blind Faith platform with design capacity of 75,000 bbl/d. The project involves three production wells tied back using one flowline.

Steve Green, president of Chevron North America exploration and production, said the firm's GoM presence

accounts for "some of the lowest carbon intensity production" in its portfolio.

At nearly 6 kilograms of CO₂ per barrel of oil equivalent, its carbon intensity is a "fraction of the global industry average."

It will be the supermajor's first GoM development in the Norphlet trend of the Mississippi Canyon area, in water 6,550 ft deep, about 160 miles southeast of New Orleans.

"Once complete, Ballymore is expected to add a reliable supply of U.S. produced energy to help meet global demand. The project is designed to lower development costs by using a subsea tieback approach, standardized equipment and repeatable engineering solutions—leveraging existing operated infrastructure," Green said in a statement.

Lime Rock-Venice

Talos Energy kicked off 2023 with the announcement of commercial deepwater discoveries in the GoM that will tie back to the nearby Ram Powell platform, the company said in January.

The company reported the Lime Rock and Venice prospects, which the company holds 60% working interest



Top Gulf of Mexico Projects

Project name	Country	Block/PL	Water depth (feet)	Status	Onstream	Operator
1. Ballymore	U.S.	Mississippi Canyon Block 607	6,550	Sanctioned	2025	Chevron
2. Lime Rock-Venice	U.S.	Viosca Knoll Blocks 912, 1000	3,200	Planning	2024	Talos Energy
3. Spruance	U.S.	Ewing Bank Blocks 877, 921	1,600	Onstream	2022	LLOG
4. Taggart	U.S.	Mississippi Canyon Block 816	5,650	Sanctioned	2023	LLOG

Source: Hart Energy research; company reports

in each, had found oil and natural gas in the fourth quarter of 2022. Talos operates the Ram Powell tension leg platform with 100% interest.

Talos reported 78 ft of pay in the Lime Rock primary target and 72 ft of pay in the Venice primary target, saying in a press release that both had “excellent geologic qualities.”

Pressure, fluid and core samples were collected to confirm the discoveries. Talos also said the expected combined gross recoverable resources are in line with pre-drill estimates of 20 MMboe to 30 MMboe, with 40% being oil and 60% being liquids.

Talos expects combined gross production rates in line with pre-drill estimates of 15,000 boe/d to 20,000 boe/d. Talos said the pair will produce through a shared riser system at the Ram Powell facility. Lime Rock’s subsea tieback to Ram Powell will be 9 miles, while Venice’s will be 4 miles.

Completion operations on the project are planned for the second half of 2023, with first production from both wells anticipated by the first quarter of 2024.

Spruance Field

Louisiana-based LLOG announced in June 2022 the firm had reached first production from its two-well subsea

development in Spruance Field in deepwater GoM.

The two-well subsea development came online with average production of approximately 16,000 bbl/d and 13 MMcf/d of gas through a 14-mile subsea tieback to the EnVen-operated Lobster platform in Ewing Bank Block 873, the firm said in a statement.

Spruance Field was initially discovered by LLOG and its partners in mid-2019 via a subsalt exploratory well drilled in 1,570 ft of water to a total depth of 17,000 ft and logged approximately 150 net ft of oil pay. A second well was drilled from the same location as the discovery well to a total depth of 16,600 ft in early October 2020 and found over 200 net ft of oil.

First production was achieved less than three years after the initial exploratory discovery well was drilled in mid-2019. LLOG is the Spruance Field operator, owning a 22.64% working interest with partners Ridgewood Energy, EnVen, Beacon Asset Holdings, Houston Energy, Red Willow and CL&F, who own 23.89%, 13.5%, 11.61%, 11.2%, 11.15% and 6% working interests, respectively.

“By remaining active throughout commodity price cycles and continuing to deliver world-class results, we are seeing significant production growth in a higher pricing environment,” LLOG president and CEO Philip Lejeune said in the statement.



Top Atlantic Ocean Projects

Project name	Country	Block/PL	Water depth (feet)	Status	Onstream	Operator
1. Anchois	Morocco	Lixus License	2,700	Planning	2024	Chariot Energy
2. Begonia	Angola	Block 17/06	1,300-2,300	Sanctioned	2024	TotalEnergies
3. Cypre	Trinidad & Tobago	East Mayaro Block	260	Sanctioned	2025	BP
4. Lapa South-West	Brazil	BM-S-9	7,000	Sanctioned	2025	TotalEnergies
5. Wales	Guyana	Stabroek Block	4,600	Planning	2024	Exxon Mobil

Source: Hart Energy research; company reports

ATLANTIC OCEAN

Parts of the vast Atlantic Ocean are becoming hotspots for offshore drilling and subsea tiebacks will likely be a key part of the calculus that makes it possible. From Trinidad and Tobago in its northern waters to the Angolan coast, companies are investing billions to increase the potential of these projects.

Begonia

The \$850 million Begonia development comprises five subsea wells tied back to TotalEnergies' Pazflor FPSO. The field is located in Block 17/06, about 90 miles off the Angolan coast in water depths of 1,300 ft to 2,300 ft.

Begonia is the second TotalEnergies project in Angola to use a standardized subsea production system, which the operator says is saving up to 20% on costs and shortening equipment delivery time.

Production from three wells will be gathered through a 12-mile multiphase production flowline, connected to an existing riser. There are two water injector wells as well. Once online in late 2024, it will add 30,000 bbl/d of production to the Pazflor FPSO.

TotalEnergies awarded McDermott International the engineering, procurement, supply, construction, installation, pre-commissioning and assistance to

commissioning and start-up contract for Begonia. McDermott will provide all EPSCl services for subsea umbilicals, water injection and production flowlines. TechnipFMC is supplying the subsea production under a framework agreement that covers brownfield developments in blocks 17 and 17/06.

Cypre

Drilling on the bp Trinidad and Tobago (bpTT) Cypre offshore gas project is beginning this year with first production expected in 2025.

Cypre will be bpTT's third subsea development, which includes seven wells and subsea trees tied back into the team's existing Juniper platform with two new 9-mile flexible flowlines, according to a bpTT statement. At peak production, the development is expected to produce an average of up to 300 MMcf/d, the company said.

The Cypre gas field is 48 miles off the southeast coast of Trinidad within the East Mayaro Block, in 260 ft of water in the North Atlantic Ocean.

OneSubsea and Subsea Integration Alliance were awarded a contract for the project. Subsea Integration Alliance's scope covers concept and design, engineering, procurement, construction and installation of a two-phase liquid natural gas tieback to the Juniper platform, along with topside upgrades. OneSubsea will deliver subsea production systems.

Cypre will access power from the Juniper platform, eliminating the need for additional power generation. The development reflects the bpTT strategy of "efficiently

developing the resources in our existing acreage so we can bring new gas to the market faster, all without increasing operating emissions," said David Campbell, president of bpTT.

Lapa South-West


TotalEnergies approved the final investment decision for the \$1 billion Lapa South-West oil development in the Santos Basin, located 186 miles off the coast of Brazil in January.

Lapa South-West in Block BM-S-9 in the Santos Basin will be developed through three wells, connected to the existing Lapa FPSO 7 miles away, which has been producing Lapa North-East since 2016. Lapa South-West is in 7,000 ft of water.

At production start-up, expected in 2025, Lapa South-West will increase production from Lapa Field by 25,000 bbl/d, bringing the overall production to 60,000 bbl/d.

"With its efficient engineering approach and synergies with existing facilities, this project illustrates TotalEnergies' strategy of focusing on low cost, low emissions assets," said David Mendelson, senior vice president, Americas at TotalEnergies Exploration & Production.

Aker Solutions will deliver up to three subsea trees and control systems, a tie-in, structures and subsea umbilicals, as well as associated equipment and installation work.

TotalEnergies operates the project with a 45% interest, in partnership with Shell with 30% interest and Repsol Sinopec with 25% interest. 

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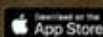


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MERGE CEO TALKS EVS, TAX CREDITS AND SELLING IN MIDLAND, TEXAS

Glen Stancil, president and CEO of Merge Electric Fleet Solutions, discussed the electric vehicle industry and the opportunities and challenges to gaining traction in one of the world's oil capitals: Midland, Texas.

in PIETRO D. PITTS
INTERNATIONAL
MANAGING EDITOR
@PietroDPitts
pdpitts@hartenergy.com

Merge Electric Fleet Solutions president and CEO Glen Stancil sat down with Hart Energy international managing editor Pietro D. Pitts to discuss the biggest opportunities and challenges for the Houston-based company. Merge helps other companies electrify their fleets and their employees' personal vehicles.

Stancil discussed electric vehicle (EV) tax credits and why they're not all they're cracked up to be, barriers to adoption, infrastructure workarounds and how Merge is trying to gain traction in Midland, Texas.

Pietro D. Pitts: What is Merge doing in the EV space?

Glen Stancil: Merge is a next-generation fleet management company. Today's fleet management companies provide vehicle services to businesses that run fleets. Primarily their services are acquiring and disposing of vehicles. It's very much a transactional buying-and-selling process and lots of companies rely on it to outsource the transactional elements dealing with vehicles.

EVs are a little different. You've got to make sure there's sufficient capability in that EV for the use case [that] you're going to put it into, and then plan the charging and the vehicle together.

So, it's a joint decision, and you've got to think about where the infrastructure is going to go for that vehicle. Merge uses a data-driven approach to look at how the current fleet gets used to find the best candidates are for deployment and the charging infrastructure that's required. Then we build a transition plan for the fleet, which includes the vehicles and the charging infrastructure, and we help [companies] execute that transition plan as a set of services.

PDP: Are there usual incentives to buy EVs offered to employees that are driving fleet vehicles?

GS: There are two different programs. One has to do with [the fact] a lot of those vehicles from the fleet are now take-home, especially post-COVID. One element of what we do is provide home charging that effectively the company is paying for in order to get that fleet vehicle charged at home. The second is what I call an employee program, where you incent employees who aren't necessarily driving company vehicles to go electric with their personal vehicle.



PDP: Is home charging more cost-effective for an employee compared to at work or some other public site?

GS: There are a lot of reasons why home charging can be economic. Many employees can cost-effectively utilize a panel in their garage for between \$500 and \$1,500. Also, employees don't pay the demand charges like commercial companies. By contrast, the power in a parking structure or an open parking lot can be much more expensive on an upfront and ongoing basis.



“Once they [oil and gas workers] understand the capability of the truck... they’re very impressed by the frunk, the torque, the horsepower and then the ability to take power off the vehicle.”

—Glen Stancil, *Merge Electric Fleet Solutions*



PDP: How have oil and gas sector workers in Midland, Texas, taken to the idea of using an EV like the Ford F-150 Lightning?

GS: Once they understand the capability of the truck... they’re very impressed by the frunk [trunk in the front of the vehicle], the torque, the horsepower and then the ability to take power off the vehicle. Those are the four things that sell people on that truck. I think the acceptance is there once you have the conversation, and they really appreciate that electricity comes mostly from the gas they produce.

PDP: In terms of the energy transition and the move from fuel vehicles to EVs, we’re still not there yet, right?

GS: No. We still have a long way to go in decarbonizing the transport sector. While EVs have hit a tipping point at 5% of new car sales, they struggle to address some use cases today. So we must continue advancing low-carbon and no-carbon fuels of all types to ensure there is a cost-effective option for every use case. EVs are just one piece of the puzzle.

PDP: Is Merge only focused on the energy sector?

GS: We focus on other sectors including health care, renewables, utilities, lots of different areas. We tend to focus on light-duty cars, trucks and vans, partially because that’s where the economics work. You certainly have medium and even heavy-duty [vehicles], but the economics can be challenging. For instance, a semi-tractor that uses diesel might cost \$180,000 and the electric version might cost \$450,000. It’s really tough to get the economics and the payback to work on that. Right now, with electric light there’s scale, there’s volume. There’s plenty of opportunity.

PDP: Is there still an issue now with EV prices and a lack of charging stations?

GS: The two big barriers right now to EV adoption are vehicle price and broad, deep and reliable charging. So lots of places, depth where it is, and it has to work great. Those are the two big barriers.

Merge focused on fleets because the dependence on public charging is minimal, and fleets take a total cost of ownership perspective to a purchase. It may cost more upfront, but if I’m saving on fuel and maintenance and time to pay that back, I’m OK with that. By contrast, consumers focus on the sticker price or a monthly payment.

PDP: Does the U.S. have enough of the necessary minerals to really make EVs that are truly North American?

GS: Not today. We have to develop new lithium sources [and others], which takes time.


PDP: If that’s an issue, is that going to slow development of EVs going forward?

GS: There is global capacity to meet the U.S. EV demand of critical minerals in the short term. However, many of those sources are not considered secure, and the U.S. does not have the capacity to satisfy our own demand today—much less tomorrow. The IRA is structured to incent the development of minerals capacity in the U.S. and other secure locations by tying tax credit value to the mineral sources.

PDP: With the tax credit and talk about energy security, what is the biggest challenge facing the EV industry?

GS: I think vehicle pricing is our big challenge this year. Last year I would have said vehicle availability, but between rising prices and rising interest rates, I think vehicle availability is going to become less of an issue than vehicle affordability in 2023.

PDP: What’s the biggest opportunity facing the EV industry this year?

GS: I think the employers supporting their employees going electric would be a really big opportunity this year. In addition to aligning with the company’s ESG commitments, an employee program creates real attraction, retention and return-to-office benefits for the company. 



AROUND THE GLOBE:

THE RUSSIA-UKRAINE WAR AND ENERGY SECTOR CERTAIN UNCERTAINTIES

 PIETRO D. PITTS

INTERNATIONAL
MANAGING EDITOR

 @PietroDPitts

 pdpitts@hartenergy.com

Capital discipline, buybacks and dividends will persist in 2023 amid varied political and economic uncertainties surrounding Russian President Vladimir Putin's ongoing war in Ukraine.

That's the common message permeating from the boardrooms of big energy players such as Exxon Mobil Corp. and Chevron Corp. in North America and BP Plc and Shell Plc in the U.K., as well as Spain's Repsol, Italy's Eni and France's TotalEnergies.

A similar sentiment is shared by most independents and small-to-medium sized companies—and not only in the upstream sector.

The start of the Russia-Ukraine war further disrupted global supply chains that were still recovering from COVID-19. U.S. bans on Russian oil imports and other energy commodities and moves by European countries to reduce their reliance on Russian oil and gas, coupled with Moscow's decision to reduce energy exports to Europe, set off a global energy crisis, stoked inflation and pumped the brakes on global economic growth—just as world economies were looking to put the worst of the pandemic behind them.

At the governmental level, what is certain in 2023 is that the U.S. and its allies will continue to stand with Ukraine, keeping energy security a topical issue not only in Washington but around the world as countries continue to grapple with energy security—and will for the unforeseeable future, even as the LNG sector elevated its game last year and was seen as the preferred energy source in the U.K. and Europe.

U.S. and European leaders aren't alone; Beijing and New Delhi are also dealing with energy security headwinds. The Russia-Ukraine conflict saw China and India, the world's most populated countries, turn increasingly to coal, which led to elevated greenhouse-gas emissions. Even Germany was forced to turn to coal amid the incorporation of floating LNG facilities.

This year, global gas and LNG markets are expected to evolve as market dynamics point to a structural change, Shell reported in February in its "LNG Outlook 2023." Importantly, the company said "continued volatility [is] expected in the near term ... [as] the global LNG market is expected to remain tight and exposed to supply and demand shocks, with limited new supply coming online.

More investment in supply will be needed to meet future LNG demand."

The uncertainties in 2023 are varied and complicated but some in key markets warrant heightened vigilance.

The U.S.' plan to boost production could meet resistance as a "value over volume" proposition starts to gain pace. Likewise, the U.S. can't immediately bring on liquefaction capacity over the near term, even as Europe and an awakening China boost demand for LNG.

Last year's energy crisis in Europe, including the U.K., pushed LNG imports to 121 million tonnes in 2022, up 60% compared to 2021, according to Shell, as lower demand in China and high gas prices in South Asia allowed Europe to pull in more cargoes. This year will likely be different, and many governments are already fixated on next winter.

A decision by China's President, Xi Jinping, to walk back a zero-COVID policy is likely to translate into higher domestic demand for oil, gas, LNG, gasoline and jet fuel. The pace of China's economic recovery will depend on COVID infection rates, and energy pundits fear a spike in cases in the first half of 2023, but China is still an attractive market for energy.


Surging LNG prices pushed India to consume more coal in 2022. With gas and LNG prices in retreat and sanctioned Russia looking for other energy markets, India looks like a good candidate to receive more Russian energy.

Certainly, China and India are pondering their options around Russian energy.

The likely biggest wildcard this year surrounds Putin's ability to continue to wage war in Ukraine as the U.S. and its allies boost military equipment deliveries to Ukraine.

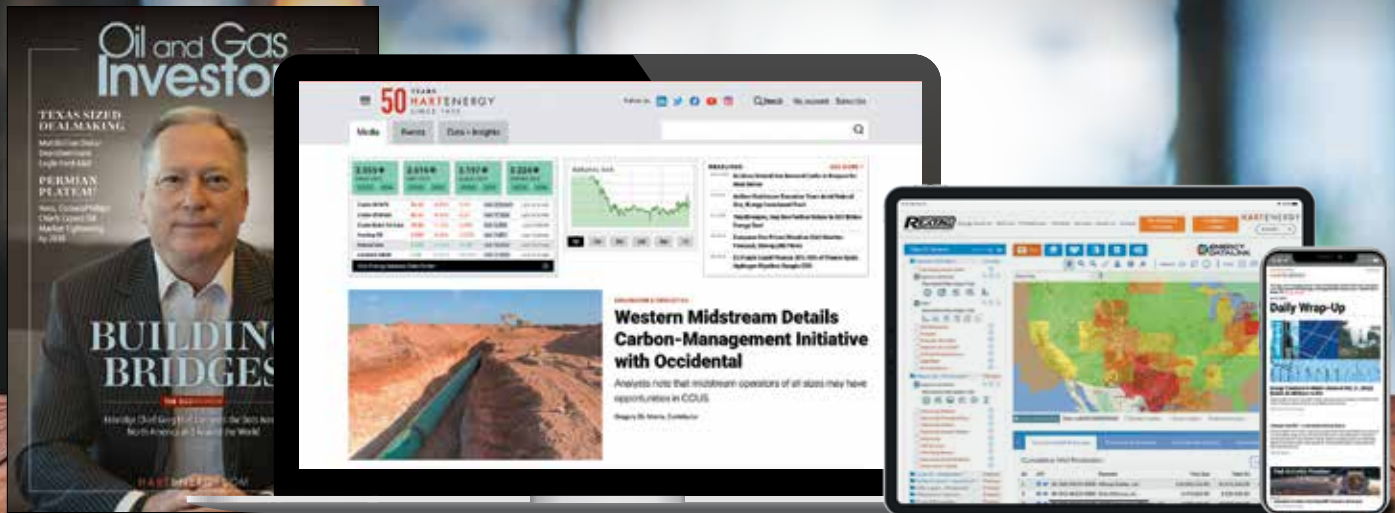
Putin's invasion of Ukraine seemingly crashed an energy transition party that was starting to gather momentum. The conflict reminded the world that renewables still have a way to go and fossil fuels will remain in demand for decades to come.

Europe's earlier decision to keep all its eggs in Putin's energy basket wasn't a good one. And Europe's pivot to the U.S. to replace Russian energy, primarily gas, while a good decision for now, may not be the best over the longer term.

The most certain thing to do this year is prepare for more uncertainties. 

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ECOPETROL PLANS, PARTNERS IN THE PERMIAN BASIN

Felipe Bayón, the CEO of Colombia's state-owned Ecopetrol, touts Colombia's offshore gas potential and advances in the Permian Basin with Occidental Petroleum Corp.

in PIETRO D. PITTS
INTERNATIONAL
MANAGING EDITOR
@PietroDPitts
pdpitts@hartenergy.com

Ecopetrol CEO Felipe Bayón spoke with Pietro D. Pitts, Hart Energy's international managing editor, at CERAWEEK by S&P Global in March to discuss the advances the state-owned company has made under his leadership. Bayón, who stepped down from his position on March 31, remains optimistic about the company's joint venture with Occidental Petroleum Corp. in the Permian Basin. He's equally excited about the recent gas discoveries offshore Colombia and the company's ability to gradually boost reserves.

Pietro D. Pitts: You've told me before that Ecopetrol has a drilling inventory of about 10 years. Should the new government ban new exploration, is that still the case?

Felipe Bayón: It's still the case, and there're a couple of things that are worth mentioning. First, we've just announced the best results ever in the history of Ecopetrol. Production is rising and on average closed the year at 709,500 boe/d. In December, we had 735,000 boe/d, and the good news is it's back to pre-pandemic levels. The fields are working well despite a few issues here and there because of civil unrest in some fields that have had to be shut down. But things are good from a production point of view.

Refining, it's actually running very well. We started the expansion of the Cartagena refinery last year [and] went from 150,000 bbl/d to 200,000 bbl/d of capacity, which is very timely with the country actually having higher demand than what we previously had.

If you look at exploration, we had seven discoveries. We're still evaluating some of the wells that we started drilling late last year, and two of those were the large discoveries offshore—Uchuva and Gorgon.

Over the past five years, we've invested \$400 million in innovation, technology and research. The benefits that we've been able to certify only in the last two years are close to \$1 billion, so it's paying off. Last year we had the safest ever year ... from a personnel and process safety perspective. So if you look at the different bits and pieces, it's running well. Why is



this relevant? Because we're building on from that base, which is quite solid. This year capex will reach \$5.6 billion [to] \$6 billion, an increase from last year, and it includes \$1 billion for [transmission company] ISA [Interconexión Eléctrica SA]. But if you look at our ability to execute, to actually deploy capital, it's improved significantly over the years.

Having said that, back to your point, that uncertainty. All in all, I think there's some aspects for some variables that you say could create uncertainty. Longer term, I do agree with you, and a lot of investors talk to us and they partner with us or they invest in us and they say, "Look, what's going to happen? What's the outlook?" We have 10 years out in terms of exploration opportunities. We're shooting more seismic—close to 2,000 km this year—which is a lot compared to what we were doing earlier. And then we're reprocessing at least five to 10 times more [onshore and offshore] depending on the year. The good thing about this is that we can go back and look at the data with new technology and new capabilities, more processing speed and we find more stuff. And if you're thinking about infrastructure, net

exploration or near field exploration, this is very helpful.

I firmly believe that the conversation around all the new contracts and the possibility of granting new contracts needs to remain open. It's a conversation that is responsible with the

country that needs to be based on data and facts, and it has to be based on one principle that I believe is quite relevant, which is energy sovereignty. The war in Ukraine has taught us that we're fragile. And as much as you can, you want to ensure that you have your own energy to consume and you don't want to rely on third parties for that.

PDP: Is Colombia at risk of moving the transition too fast if it stops exploration and doesn't properly use fossil fuel revenues to finance that transition?

FB: Five or six years ago, we had 6.3 years of oil reserves and today we have 8.3 years. So, we've managed to increase two years to [the] life of [our] reserves, which is good. It's

“The enemy is not the source of energy. The enemy is the emissions.”



Felipe Bayón, the CEO of Colombia's state-owned Ecopetrol, speaking at the "Voices of Innovation" session in the Agora Studio at CERAWEEK by S&P Global.

Tim Heitman/CERAWEEK by S&P Global

not 20 years, but in today's world ... [would] you want to be anywhere above 10 or 12 years? Probably not. Our gas reserves have gone down from almost 12 years to 8.8 years [but] the thing with gas is that we've had 1P discoveries, but then in contingent resources, we have things like Gorgon. It's a matter of time and work to move those into the reserve and production category. Then in the discovered reserves yet to be appraised, we have things like Uchuva.

I do believe, and it's a conversation we've had over the past two days here in Houston at CERAWEEK, is 'what's the right pace to do a transition that's orderly?' And at the end of the day, you want to ensure that you continue to provide energy to our people, it's one of the most powerful ways of closing gaps overall. And it could be ... electricity, gas, diesel, gasoline, jet fuel, you name it. The most costly energy is what you don't have. So Colombia is now sufficient on gas as we've made discoveries. We've pledged three or four years ago to be a gassier company, and we're showing that we're on track. We still need to do quite a few things to deliver, but that's going on. We are self-sufficient in diesel and gasoline, and we need to import some things.

I'm a firm believer that we're advancing quite well in terms of the transition. So [we've moved on] geothermal, solar, wind, hydrogen, CCUS [carbon capture, utilization and sequestration], you name it, and there's quite a big advance after the purchase of ISA. But if we go too quickly, we have the risk or we run the risk of creating such a cost for people that it's unbearable.

PDP: After the Gorgon and Uchuva finds, you talked about the potential creation of a new offshore province, and Ecopetrol still has the four offshore blocks with Occidental.

“The most costly energy is what you don't have.”

How much potential are we talking about?

FB: From a prospect point of view, we're talking about 75 to 100 Tcf of gas, reserves today are 3 Tcf. This is massive, almost 35 times the gas reserves that we have here, or if converted to an oil equivalent, that would be 16 billion barrels. Some of those resources need to be de-risked, and that's going to take some time. If you think about oil specifically, I think it's going to be required in the world for the next 20 to 30 years at least. The debate is whether the world is going to be using 105 MMbbl/d or 100 MMbbl/d or 95 MMbbl/d? So, where is that going to come from? How do we ensure Ecopetrol continues to be very efficient, to be a reliable source of good quality crudes for ourselves and for our customers?

We have made good progress in terms of decarbonizing our operations. Again, the enemy is not the source of energy.

The enemy is the emissions. And that's

something we need to tackle further. I do believe there's enough potential to ensure that Colombia continues to be self-sufficient. And why not, we could even think about being a regional hub and exporting [with this reserve potential].

PDP: What's the timeframe for initial volumes to flow?

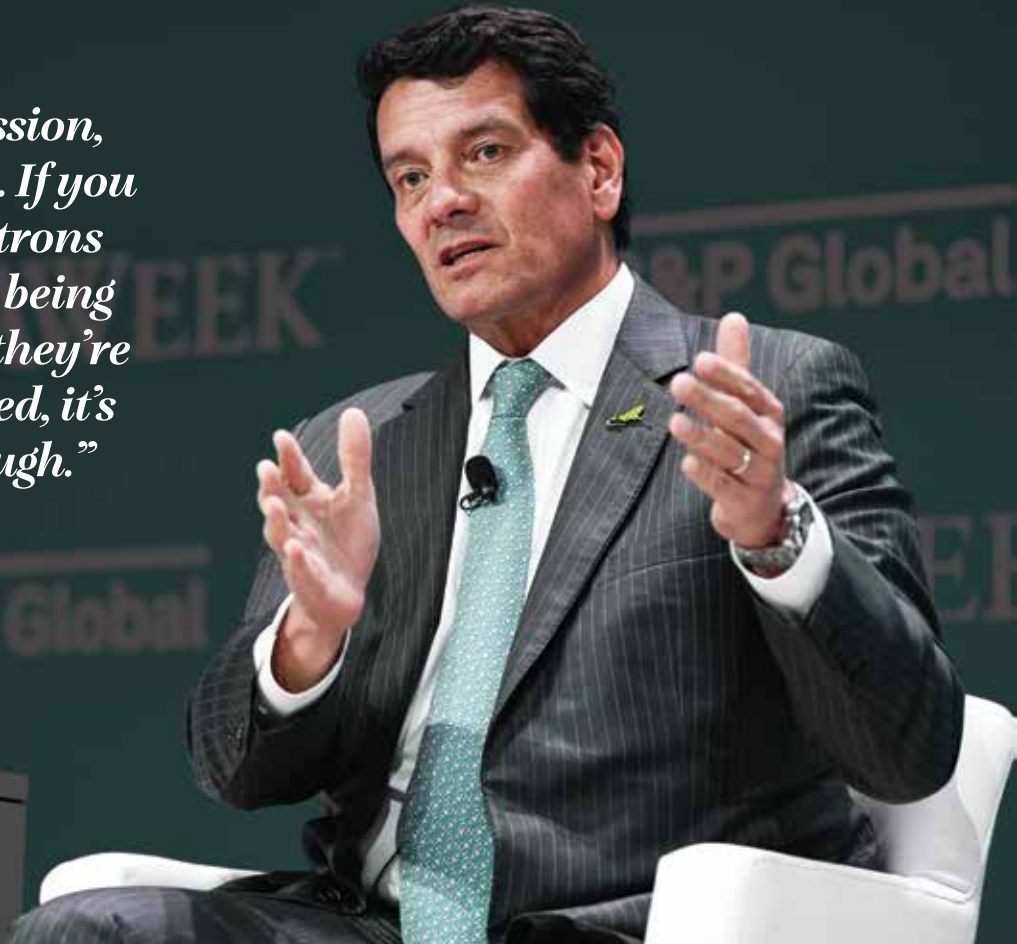
FB: I hope to see molecules in 2026 from some of these discoveries, then some other volumes in 2028 to 2030. The two wells we drilled last year confirmed discoveries and opened up the possibility of seven offshore wells ... this is something that we hadn't seen before in the history of the country.

PDP: Ecopetrol is on track to again achieve double-digit production in the Permian, is that correct?

FB: Remember, in November 2019 there were zero barrels and no production. Last year production averaged 37,800 boe/d, and in December, we had 57,400 boe/d. We have

“Without transmission, there’s no transition. If you cannot get the electrons from where they’re being generated to where they’re going to be consumed, it’s going to be very tough.”

Felipe Bayón speaking at the low-carbon “Pathways to Net Zero” panel at CERAWeek by S&P Global.



CERAWeek by S&P Global

more than 200 wells and some increases in reserves, which is brilliant. We made an additional deal, and we’re not only in the Midland, [but] we’re in Delaware as well. It’s a bit of high grading, and the most important thing is that production is going up, reserves are going up. Additionally, the Permian barrels have less than eight kilograms of CO₂/bbl. Some experts say the industry average is 50 to 60 kilograms of CO₂/bbl, so this is on the low end of the range. And a lifting cost is below \$4 per barrel. Last year alone, it gave us \$644 million of EBITDA. So, it’s a safe, healthy, environmentally friendly business. And we love our partner, Oxy. We learn from them, we trust and respect each other, and the partnership has demonstrated that it’s working well.

PDP: How much of an increase will we see this year in the Permian?

FB: It’s really going to average between 50,000 to 55,000 boe/d in 2023. Additionally, our operations in the Gulf of Mexico will add another 10,000 boe/d. So, it’s increasing, and we’re always looking at opportunities to make operations safer. We have a lot of people in the operation, which gives us a lot of know-how and technology and knowledge transfer. So, I’m very enthused.

PDP: Are you only looking to grow organically or by other means?

FB: We’re always looking and accessing opportunities as oil and gas companies do.

PDP: Are you still looking to get into the transmission business here in the U.S.?

FB: The answer is yes. We’ve had one geography that we really like because we do believe there’s opportunity, especially with the [Inflation Reduction Act] right now. The U.S. ... I think it’s committed to two actually very large

investments in terms of not only transition but transmission. And one thing that I’ve said, and I’ll repeat it: Without transmission, there’s no transition. If you cannot get the electrons from where they’re being generated to where they’re going to be consumed, it’s going to be very tough. We’ve been talking to people about potential things that we can do jointly with them. Some incumbents here in the U.S., hopefully you’ll hear more about.

PDP: In Colombia, there’s talk that President Petro’s government is looking to import gas from Venezuela. Is that likely to happen?

FB: Hopefully not because it’s off spec. There needs to be investment in the pipeline that needs to be fixed now. But, why would you bring gas from Venezuela that is not producing jobs, taxes, royalties in Colombia if you have the potential in Colombia? It doesn’t make any logic to me.

PDP: On the topic of imports, will Colombia continue to turn to LNG through its Caribbean terminal?

FB: Yeah, but that’s a safety net for when you have power plants that are on maintenance, and you have that need at gas-fired power plants. As a matter of fact, we’re using a very small terminal; it’s micro-LNG in Buenaventura. A couple of months ago, when there were blockades and unrest, Buenaventura was destined to have no gas, but by bringing in this small cryogenic LNG gas, the city of Buenaventura was able to have gas.

PDP: Guyana is an emerging powerhouse with a lot of associated gas, maybe 17 Tcf. They’ve launched a bid round offering 14 blocks offshore. Has Ecopetrol considered participating?

FB: We’ll be looking at it, absolutely. 

GLOBAL HIGHLIGHTS

NORTH AMERICA

Baker Hughes, AWS Team Up Managing Production

Baker Hughes signed a strategic collaboration agreement with Amazon Web Services (AWS) to develop, market and sell the cloud-based Leucipa automated field production solution, which allows operators to manage field production, Baker Hughes announced on Feb. 27 in a press release.

According to AWS, Leucipa combines AWS cloud capabilities with Baker Hughes' industry expertise in a solution that enables scalable, automated and data-driven oil and gas production.

Baker Hughes and AWS will continue to collaborate to add new capabilities to the Leucipa automated field production.

TGS Wins GoM OBN Work

TGS signed a letter of authorization to conduct a proprietary sparse ocean bottom node (OBN) survey in the U.S. Gulf of Mexico (GoM). TGS said on Feb. 9 the survey, expected to mobilize in the second quarter of 2023, will last about 100 days.

US Proposes First Offshore Wind Lease Sale in GoM

The U.S. has proposed its first-ever offshore wind lease sale for the GoM, continuing its efforts to deploy 30 gigawatts of offshore wind by 2030.

The move, announced on Feb. 22, came as the Biden-Harris administration also took steps to grow the nation's floating wind sector by launching an offshore wind transmission study focused on the West Coast, expanding an offshore wind R&D consortium and developing an offshore wind operations and maintenance roadmap.

The proposed GoM wind lease sale, home to vast oil and gas production, would open 102,480 acres offshore Lake Charles, La., and two areas totaling 96,786 acres offshore Galveston, Texas, for wind development. Combined, the areas could power nearly 1.3 million homes with clean energy, according to the Interior Department.

If the Bureau of Ocean Energy Management proceeds with the sale, a final notice will be published at least 30 days before the sale, announcing the sale's time, date and qualifying companies.

AEP, Lightsource BP Sign PPA Indiana Solar Project

Lightsource BP and American Electric Power subsidiary AEP Energy Partners signed a power purchase agreement for a 188-megawatt (MW) solar project near South Bend, Ind., according to a Feb. 23 press release.

"This power purchase agreement is a great example of how energy buyers with sustainability goals such as AEP Energy Partners can work with us to spur the buildout of new solar projects that will improve the health and energy security of communities across America while helping strengthen local economies," Lightsource BP's CEO of the Americas, Kevin Smith, said in the release.

The solar farm, dubbed Honeysuckle Solar, is designed to generate enough electricity to power 27,000 homes and

reduce CO₂ emissions by 204,000 metric tons per year, said Lightsource BP.

With South Bend-based Inovateus Solar LLC as the construction contractor, building of the facility has already begun. Lightsource BP will finance, build, own and operate the solar farm, as well as sell solar energy generated at the facility to AEP. Commercial operations are scheduled to start in 2024.

Fugro Opens Remote Operations Hub in Canada

Fugro launched its new remote operations center in St. John's, Canada, on Feb. 22. The new communications center reduces the number of crew required to work offshore while providing data processing in near-real time, the company said.

Fugro built the center with support from the federally funded Newfoundland and Labrador Offshore Oil and Gas Industry Recovery Assistance Fund. The fund was created to maximize employment among Newfoundland and Labrador residents and support the recovery of the local offshore oil and gas industry.

EUROPE

Anning, Somerville EPIC Contracts to Be Let in 3Q

Hartshead Resources NL launched the pre-qualification process for the Anning and Somerville gas field platform and jacket engineering, procurement, installation and commissioning (EPIC) contracts.

The Phase I development FEED and geotechnical site survey of the platform locations for the Anning and Somerville gas fields in the U.K. Southern Gas Basin is scheduled to be complete in April 2023, Hartshead announced on Feb. 24.

The operator said it expects to award the platform and jacket EPIC contracts in the third quarter of 2023.

Shell Hits with Pensacola in North Sea

Deltic Energy said the Shell-operated Pensacola find in the southern North Sea could represent one of the area's largest natural gas discoveries in over a decade.

The well confirmed pre-drilling P50 estimates of 300 Bcf of ultimate recoverable reserves, Deltic said in a Feb. 8 press release.

Deltic believes the Pensacola discovery will open a new play in the mature basin, Deltic CEO Graham Swindells said in the release.

Well 41/051-2, drilled by Noble Resilient, found gas and oil in the primary Zechstein Hauptdolomite carbonate target interval. The well encountered the top Hauptdolomite reservoir and confirmed a reservoir thickness of 18.8 meters (m) with better-than-expected porosity averaging 16%.

As planned, the well penetrated the edge of the Pensacola structure in a down dip location and has proven a substantial hydrocarbon column, Deltic said.

Subsea7, DeepOcean Win Equinor Contracts

Equinor awarded consortium Subsea7 and DeepOcean a pair of contracts for the Irpa and Verdande field developments in the Norwegian Sea.

The Irpa subsea tieback project, located in 1,350-m water

depth, will connect Irpa with the Aasta Hansteen FPSO about 80 km away. The contract scope includes engineering, transportation and installation of a monoethylene glycol pipeline, a production riser, umbilical, subsea structures and tie-ins, Subsea7 announced on Feb. 10.

The Verdande subsea tieback project in the Nordland Ridge area involves a subsea tieback to the existing Skuld Field and Norne FPSO facilities. The contract scope includes engineering, transportation and installation of a 7.5-km pipe-in-pipe production pipeline, umbilical, flexibles, subsea structures and tie-ins.

Subsea7's Stavanger, Norway, offices will carry out project management and engineering. Fabrication of the pipelines will take place at Subsea7's spoolbase at Vigra, Norway. Offshore operations are planned to take place between 2024 and 2026, using both Subsea7 and DeepOcean's fleet of vessels.

JDR to Supply Umbilicals to Netherlands Offshore Gas Field



JDR

Large 9.2-m reels store subsea umbilical cables at JDR's quayside facility in Hartlepool, U.K.

JDR won a contract from Petrogas E&P Netherlands to supply two umbilicals for the A15 and B10 offshore conventional gas fields in the Netherlands. The fields, each in water depths of 115 feet, have estimated recoverable reserves of 17 MMboe, JDR announced on Feb. 9.

JDR will engineer, design and manufacture two subsea umbilicals that are 10 km to 13 km in length to provide vital power to two new platforms located at the A/B shallow gas field.

JDR will also deliver topside umbilical termination unit pull-in heads, hang-off bodies and umbilical termination assemblies for the project. JDR will manufacture the umbilical, topside terminations and additional subsea equipment at the Hartlepool, U.K., facility and the hydraulic hoses and LV cables in JDR's Littleport facility. When complete, the umbilicals will be attached onto 9.2-m delivery reels in Hartlepool and loaded onto an installation vessel to be taken offshore. The full scope of work will be delivered by the beginning of July 2023.

Aker BP Awards Utsira High Work to TechnipFMC

Aker BP awarded TechnipFMC an integrated engineering, procurement, construction and installation contract valued between \$500 million and \$1 billion for the Utsira High development in the Norwegian sector of the North Sea.

The contract brings together three projects that will tie back to the Ivar Aasen and Edvard Grieg production platforms, TechnipFMC announced on Jan. 31.

TechnipFMC will engineer, procure, construct and install the subsea production systems, controls, pipelines and umbilicals for the development. It follows a two-year integrated FEED study to optimize field layout.

Neptune Brings Another Cygnus Well Online

Field operator Neptune Energy announced that the 10th well in the Cygnus gas field in the U.K. southern North Sea has begun production.

Borr Drilling's Prospector 1 jackup rig drilled the well. Neptune has begun drilling for the field's 11th well, which is expected to begin production in the second quarter of this year, Neptune announced on Feb. 1.

Neptune operates Cygnus with 38.75% interest on behalf of partner Spirit Energy with 61.25%.

LATIN AMERICA

Petrobras Contracts Seven Cruzeiro Pipelay Support Vessel



Subsea7

Subsea7's Seven Cruzeiro pipelay support vessel will remain offshore Brazil through November 2023 under a deal with Petrobras.

Petrobras awarded Subsea7 a contract for the Seven Cruzeiro pipelay support vessel for operations offshore Brazil. The deal extends the Seven Cruzeiro's contract from February 2023 to November 2023, Subsea 7 announced on Feb. 24.

The contract is valued between \$50 million and \$150 million.

Transocean Locks in 910-Day Brazilian Contract

Transocean Ltd. said that a national oil company awarded ultradeepwater drillship Dhirubhai Deepwater KG2 a 910-day contract for work offshore Brazil. The estimated backlog of \$392 million excludes a mobilization fee, Transocean said on Jan.31.


The new contract is expected to begin in the third quarter of 2023.

AFRICA

Eni, NOC Plan Gas Project Offshore Libya

Eni and National Oil Corp. of Libya (NOC) will develop the Structures A&E project offshore Libya, according to the Italian energy major.

The \$8 billion project will see the development of two gas fields—Structure A and Structure E—in contractual area D with the target of starting production in 2026 and reaching a production plateau of 750 MMcf/d, Eni said on Jan. 28.

Development plans call for two platforms to be tied into existing treatment facilities at the Mellitah Complex as well as the construction of a carbon capture and storage facility at Mellitah. 



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Voices

The global energy industry descended on Houston to take part in CERAWeek by S&P Global. The overarching theme of the week attempted to address the question: How will the industry navigate a world in turmoil and lead the global transition to a sustainable, secure, abundant and affordable future? Experts from around the world spoke about the realities of the global energy transition and the challenges facing the move to cleaner energy.



“We have a huge opportunity to leapfrog and accelerate the [energy] transition by bringing the developing world faster into renewables and alternatives, rather than bringing them up through the coal and wood, and oil and gas progression that we did in the U.S. and Europe. One of our hopes is that we can actually address this through the World Bank and the other global sources of funds. We can actually manage that cost of capital and get it deployed and bring these economies along through the transition faster.”

—Michael LaMotte, senior managing director, Guggenheim Securities



“There actually is a structural supply deficit when it comes to energy supply, both for new energy and for oil and gas. And the world needs to wake up to this.”

—John Hess, CEO, Hess Corp.



“We need to have certainty that lasts beyond one election cycle so that we can make our investments that pay back over 20 or 30 years with confidence that the framework is consistent, that the approach to climate change is consistent. We’ve got to be able to get things permitted. And that’s a global challenge.”

—Meg O'Neill, CEO, Woodside Energy Ltd.



“First, we need to accelerate the [energy] transition but it will not happen overnight. We need to organize and to [not] do it in a disorganized way. The result is that today we have a lack of supply, higher prices [and] society does not accept, and all that is a mess.”

—Patrick Pouyanné, CEO, TotalEnergies



WILLIAMS' ZAMARIN ON ADDING PIPE: 'WE'RE NOT GIVING UP'

Litigation against projects should require meeting a minimum reasonable threshold, says Williams Cos. executive vice president Chad Zamarin.

in NISSA DARBONNE
EXECUTIVE EDITOR-AT-LARGE

t @NissaDarbonne

e ndarbonne@hartenergy.com

The low-hanging fruit—that is, expanding existing-pipeline capacity—“has been plucked,” leaving permit reform the only way out for getting U.S. natural gas to markets. And “we’re not giving up,” Chad Zamarin, Williams Cos. executive vice president, corporate strategic development, said at CERAWEEK by S&P Global. “We’ve got to get back to building.”

Germany conceived and completed an LNG regasification terminal in under 10 months, he noted, while “we’ve been trying to build Mountain Valley Pipeline [MVP] for eight years.

“We should be frustrated as a country that we are no longer the leader in building infrastructure,” he said.

The 42-inch, 303-mile MVP would take Appalachian gas into Virginia, connecting it to consumers along the Atlantic Coast.

The last 20 miles

Only 20 miles remain to be built—the miles that cross the West Virginia-Virginia border. There, the pipe becomes an interstate crossing that needs federal approval.

“We’ve got to be able to unlock Appalachian resources,” Zamarin said. “... The easy stuff has been done. And now, again, we’ve got to get back to building.”

Individual pipe operators, such as Williams, have found ways of expanding their pipes’ capacity.

“But I do think the industry as a whole needs to take a step back and say, ‘Hey, if we could move gas more efficiently across multiple systems, we can open up pockets of capacity that could unlock, for a much lower cost, capacity ... [not just to] the Gulf Coast.’

“There are still over 200 coal plants operating in the United States today. We’ve still got work to do to decarbonize the U.S., and we’ve got to build out the capacity to support renewables.”

Yet “we can’t permit a CO₂-sequestration well in the United States.”

Currently, “anyone can effectively bring ... litigation against one of our projects and it gets you caught in the courts forever. ... You shouldn’t be able to [do that] without [meeting] some minimum reasonable threshold standard.”

Building pipelines stall under FERC

Intrastate pipe newbuild has been less complicated because the state has domain. The constraint appears when a pipe needs to cross state lines, falling under federal domain, namely the Federal Energy Regulatory Commission (FERC).

Furthering the conundrum, natural gas is a key to the U.S. and its allies reaching decarbonization goals, Zamarin added.

“Natural gas has been the largest decarbonization tool in the United States for the last 15 years.”

The U.S.’ annual CO₂ emissions have fallen by 5 billion tons upon the advent of reliable and abundant shale-gas production beginning in the aughts.

“So it’s not [just] a ‘theory’ that natural gas is a decarbonization tool,” he said.

Meanwhile, natural gas supply is essential in the growth of renewables in the power grid. “You cannot deploy renewables without having natural gas capacity to backstop the intermittency of renewables.”


Unclogging the permit pipe is essential, too, in getting gas to allies, he added.

“[In the U.S.] we don’t stick the LNG terminal right on top of the resource. We rely on our infrastructure—we [at Williams] pull from 15 different supply basins just across our footprint—to move that gas.”

Other gas exporters, such as Qatar and Australia, have liquefaction infrastructure near the source. Meanwhile, the U.S. “is the only energy system on the planet where you can produce gas far away from where it is consumed.

And supply is not an issue. “The challenge that we have is infrastructure. It’s getting the resource from where it can be produced responsibly to the demand where it’s needed.”

Besides Europe needing LNG supply for political reasons, “there are still 3 billion people around the world that cook their food and heat their homes with wood, coal or animal manure.

“Those people need access to cleaner, more affordable, reliable energy,” Zamarin said. 

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SUB-\$2 GAS ON HORIZON AS SUPPLY GROWTH SWAMPS NATURAL GAS



JUSTIN CARLSON
EAST DALEY ANALYTICS

Justin Carlson is co-founder and chief commercial officer of East Daley Analytics in Colorado.

Natural gas futures have fallen hard in 2023, breaking below \$3/MMBtu for much of the year. While a mild winter is contributing to bearish sentiment, the bigger problem in the view of East Daley Analytics is overheated supply growth. Sub-\$2 natural gas prices are now clearly in view, and there may not be a lot the market can do to prevent them.

The decline has been swift for natural gas, with front-month Henry Hub contracts down by over 60% since mid-December 2022. Henry Hub was trading near \$7/MMBtu ahead of a bitter Arctic front, but temperatures in key Midwest and Northeast markets rapidly warmed in January and have been at times balmy, cutting into heating demand.

On March 6, the April front-month futures contract traded for \$2.60/MMBtu, and the Henry Hub strip is below the \$3 price level through June 2023.

The drop in natural gas has been a long time coming. East Daley has been warning clients for nearly 12 months of imbalances through the 2023 calendar caused by rapid production growth through our “Macro Supply and Demand Forecast,” our aggregate forecast of U.S. natural gas production, demand and imports and exports via pipelines and LNG.

We noted in our inaugural “Macro Supply and Demand Forecast,” released in February 2022: “The pre-balance storage moves above the five-year average starting in March 2023 due to growing production, surpassing 4 Tcf by 4Q23. If the market is not expecting this trend, prices could make a sharp reversal.”

While a mild winter and a shift in the demand outlook contributed to the market sentiment, the momentum from supply growth will be the unexpected “nail in the coffin” that holds prices down.

Overheated supply growth was a central theme of East Daley’s “2023 Dirty Little Secrets” report, released in December 2022, when we highlighted our outlook for 5 Bcf/d of “unconstrained” natural gas production growth in 2023 exit-to-exit, led by the Permian and ArkLaTex basins. At this pace of supply growth, storage would build rapidly and exceed the 4 Tcf upper limit on inventories before next winter.

“The natural gas story is a nuanced one. In the long term, a massive ramp in LNG demand will require a boost in production from the ArkLaTex. This dynamic presents significant opportunities for upstream investment and infrastructure growth across the U.S.”

Even after the latest market declines, the price cuts aren’t deep enough, according to our latest macro forecast. We see the need for a “shock to the system” to slow gas production growth and force producers to choke back wells and defer completions.

Too many rigs is the chief problem. The U.S. horizontal rig count totaled 715 rigs for the week of Feb. 24, 2023, according to East Daley’s Energy Data Studio, near the high of 724 horizontal rigs at the end of July 2022, when WTI crude prices were near \$100/bbl.

Notably, we expect robust production growth to occur despite rig attrition this year, meaning we have already baked in declining rig counts over the course of 2023 in our macro model to help restore balance. We see supply growth as unavoidable due to the time lag before drilling and development activity leads to first production from new wells.

In the Permian, most growth will not arrive until late in the year when expansions to MPLX’s Whistler Pipeline (500 MMcf/d) and Kinder Morgan’s Permian Highway (550 MMcf/d) are scheduled to begin service. Absent a drastic drop in crude oil prices, we do not expect the

Permian to pull back. Thus, gas production must stop growing elsewhere to balance the market.

In our latest monthly "Macro Supply and Demand Forecast," we provide two scenarios: an unbalanced forecast showing the severity of the natural gas supply problem and a "forced balance" scenario that avoids oversupply in 2023.

Figure 2 shows how these scenarios contrast in the Haynesville (ArkLaTex), to pick one basin. The solid area shows the unbalanced forecast where drilling activity, primarily from Aethon, Comstock Resources and Southwestern Energy, drives over 1.5 Bcf/d of supply growth.

The conundrum in the Haynesville is that the rigs are already in place to create this new growth. Therefore, to lower near-term production toward the balanced market, we reduce activity by 19 rigs year-over-year.

We also build an inventory of 350 DUCs by year-end 2023 to defer the start of new production. Since we presented this case, several Haynesville producers including Comstock Resources and Chesapeake Energy have announced rig cuts, but in our view these announcements so far are insufficient to avoid oversupply. If producers choose not to build DUCs, it may take more drastic supply cuts, such as well shut-ins, to balance the market.


The natural gas story is a nuanced one. In the long term, a massive ramp in LNG demand will require a boost in production from the ArkLaTex. This dynamic presents significant opportunities for upstream investment and infrastructure growth across the U.S. Of course, it won't just be in the ArkLaTex where market forces reshape the supply curve. To reach a "balanced" market will require contributions from many basins. 

Figure 1: Change in Residue Gas (Dec-22 to Dec-23)

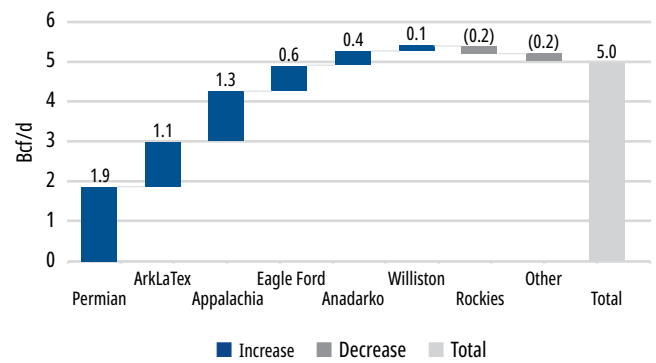
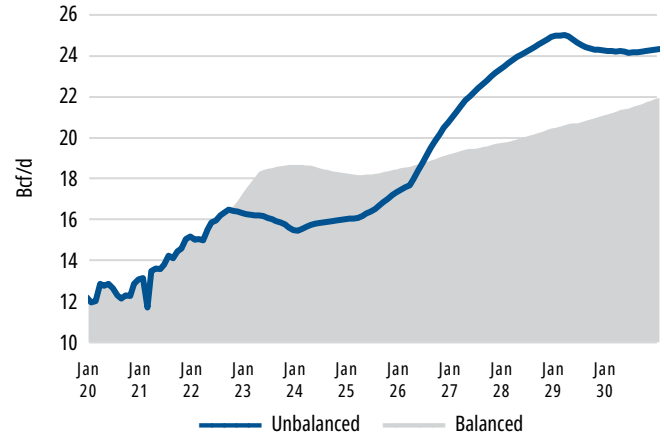
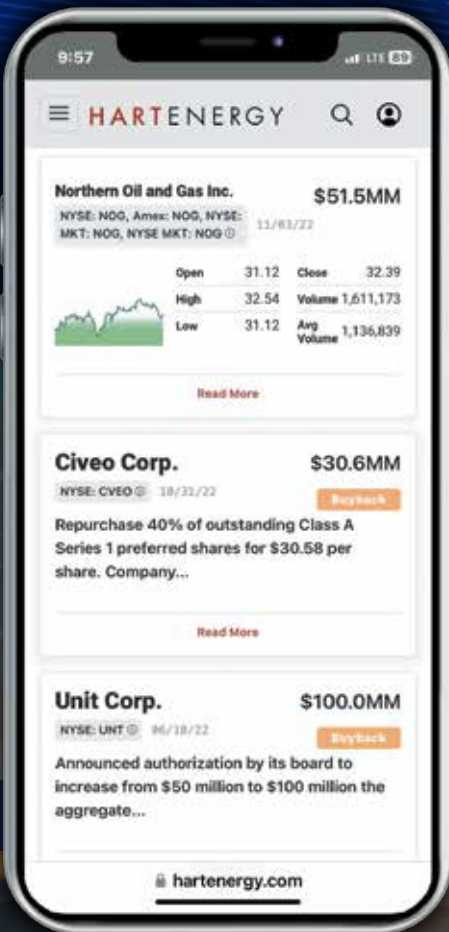


Figure 2: ArkLaTex Basin



Source: East Daley, 2023 Dirty Little Secrets



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CONOCOPHILLIPS' LONG-SOUGHT \$8 BILLION ALASKA WILLOW PROJECT APPROVED

Federal officials reduced ConocoPhillips' drill sites at Willow from five to three approved 199 well sites, but environmentalists were still angered by the decision.

The U.S. Department of Interior approved reduced amounts of surface infrastructure for the Alaska Willow Project.

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DARREN BARBEE
SENIOR MANAGING EDITOR, DIGITAL
dbarbee@hartenergy.com

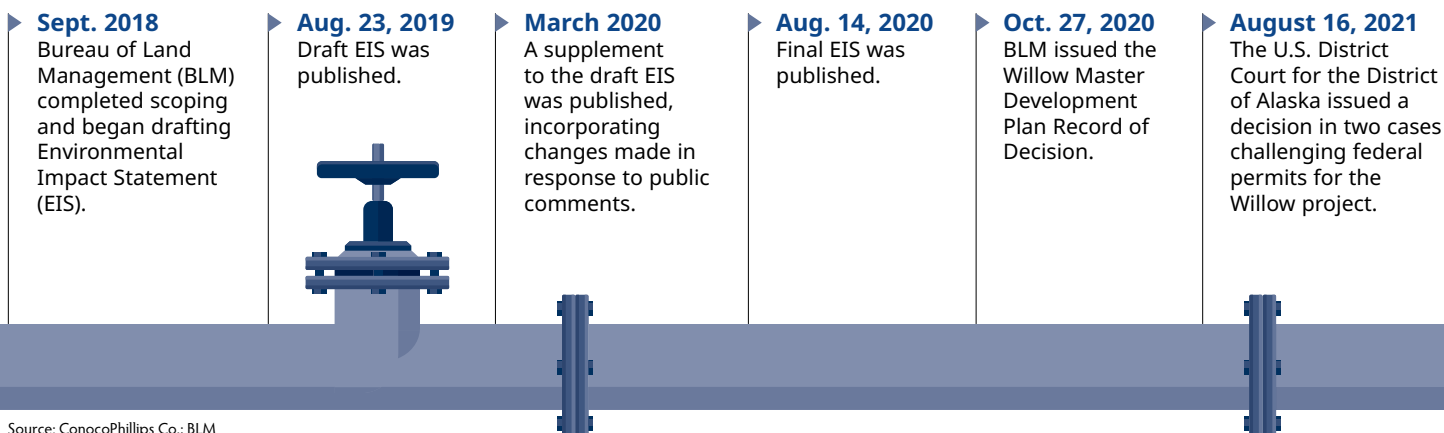
President Joe Biden's administration approved on March 13 ConocoPhillips Co.'s Willow Project on Alaska's North Slope—a downsized version of the E&P's multibillion project that illustrates the growing focus governments worldwide are placing on energy security.

The approval comes from an administration that imposed moratoriums on oil and gas drilling on federal lands, only to see the price of oil and gas skyrocket. The subsequent invasion of Ukraine by Russia has altered the thinking of the leaders of many nation states as they look to secure energy supplies.

The project has been plagued by years of delay. The Willow Project began planning in earnest in 2018. But the company's designs on the project have spanned five presidential administrations. The resulting decision released on March 13 by the U.S. Department of Interior (DOI) pares down the company's requests but undoubtedly represents a win for oil and gas producers.

The DOI's final approval substantially reduces the amount of surface infrastructure, including gravel roads, ice roads and pipelines, and gives ConocoPhillips "the least amount of project and inject wells"

Alaska Willow Project Timeline



Source: ConocoPhillips Co.; BLM



“This was the right decision for Alaska and our nation.”

—Ryan Lance, ConocoPhillips

at 199 approved, compared to a previous request for 251 well sites. Two of the five drill sites proposed by ConocoPhillips’ were denied.

In a press release, the DOI said the company will also relinquish rights to approximately 68,000 acres of its existing leases in the National Petroleum Reserve-Alaska (NPR-A), including approximately 60,000 acres in the Teshekpuk Lake Special Area.

ConocoPhillips relinquishment of 68,000 acres of its northernmost and southernmost leases within the Bear Tooth Unit also reduces its footprint there by one-third.

“This reduces the project’s freshwater use and eliminates all infrastructure related to the two rejected drill sites, including approximately 11 miles of roads, 20 miles of pipelines and 133 acres of gravel, all of which reduces potential impacts to caribou migration and subsistence users,” the DOI said.

Billions in investment

The Willow Project represents a massive \$8 billion investment by ConocoPhillips and, the company said, is the largest project in size and scale to be developed on the North Slope in more than 120 years. The project would also create roughly 2,500 construction jobs and about 300 long-term jobs.

ConocoPhillips has offered various estimates for the project’s oil production. The company’s website said Willow would produce, at its peak, 180,000 bbl/d of oil.

In November, ConocoPhillips chairman and CEO Ryan Lance told Hart Energy that Willow is “potentially a several-hundred-million-barrel resource. The peak rate would be 160,000 bbl/d.” ConocoPhillips has said cumulative barrels of recoverable oil would be at about 600 MMbbl.

“This was the right decision for Alaska and our nation,”

Lance said in a March 13 news release. “Willow fits within the Biden administration’s priorities on environmental and social justice, facilitating the energy transition and enhancing our energy security, all while creating good union jobs and providing benefits to Alaska Native communities.”

Lance noted that the project had passed through five years of “rigorous regulatory and environmental review” and that Willow is designed to support and coexist with subsistence activities with many mitigation measures built into the project design.

The project will also be a boon for the taxman. The DOI’s Bureau of Land Management estimated Willow could generate between \$8 billion and \$17 billion in levies for federal, state and local governments.

Despite the smaller scale of the project, environmental groups were angered by the decision.

The Alaska Wilderness League expressed “deep disappointment” with President Biden’s decision to greenlight the project and called it a defining decision for his administration’s climate legacy.

In a press release, Kristen Miller, executive director of the group, said the decision was wrong for the climate and protecting biodiversity.

“The Willow Project is designed to open the door to the development of billions of barrels of oil over decades,” she said. “Let’s be clear: rampant oil and gas development on our nation’s public lands must stop now. We will keep fighting the Willow Project and future projects like it. And we call on the administration to change the way we manage all our nation’s public lands for climate, starting with America’s Arctic.”

DOI’s announcement came as President Biden said he would take action to designate approximately 2.8 million acres in the Arctic Ocean nearshore the NPR-A as indefinitely off limits for future oil and gas leasing.

▶ **March 2022**

A second scoping period was completed.

▶ **July 8, 2022**

BLM released a draft supplemental EIS in response to the District Court order. The project alternatives described in the draft were subject to a 45-day public comment period.

▶ **August 2022**

The Resource Development Council, which includes Alaska Native corporations, private companies, nonprofit entities, local communities, organized labor and industry support firms, submitted comments and letters in support of the draft supplemental EIS, which reduced the environmental impact of the project.

▶ **Feb. 1, 2023**

BLM completed the final supplemental EIS, approving the project with three out of five drill pads, with one pad canceled and the decision on the last pad deferred.

▶ **March 13, 2023**

BLM issued a Record of Decision approving the development of the project as described in the final supplemental EIS.

OXY CEO VICKI HOLLUB TALKS TECHNOLOGY, CARBON MANAGEMENT

Technology partnerships are key to bringing direct air capture facilities to reality.



JENNIFER PALLANICH
SENIOR EDITOR,
TECHNOLOGY
jpallanich@hartenergy.com

From artificial intelligence to direct air capture, Occidental Petroleum Corp. (Oxy) is investing in technologies that improve production rates and help with decarbonization.

The operator is partnering up with companies such as Siemens Energy to spur technological innovation in a bid to produce cleaner energy.

Oxy uses artificial intelligence (AI) to better predict how the company's shale wells will perform over time. Now, the company is also using AI to optimize artificial lift and steamflood efforts, Oxy CEO Vicki Hollub said during Voices of Innovation at CERAWEEK by S&P Global.

"Instead of having engineers needing to adjust injection levels every day, we're able to now make that happen automatically. So artificial intelligence is happening in a big way ... in the oil and gas industry, and I think it'll get bigger as we go," she said.

The technologies that Oxy is looking at and investing in are things that the operator wants to build as a part of its core competence.

"Most of what we're doing can provide cleaner oil and gas. And we're working to make sure that happens," she said. "We've got a lot of methane reduction initiatives."

Carbon future

Hollub has frequently said that Oxy is "really in the carbon management business."

The company believes innovative carbon capture, use and sequestration (CCUS) technologies are "very much needed," she said.

"We're not just a shale company. In fact, we're a lot more than a shale company," Hollub said, noting Oxy holds core conventional assets in the Permian Basin. "In those conventional assets, we're applying CO₂, enhanced oil recovery [EOR] to those assets."

The company did pilots in shale fields to confirm a CO₂ EOR approach would work there too.

"We have this huge footprint in the Permian. We have a network of CO₂ pipelines [and], we have CO₂ processing facilities. So, our approach to the climate transition then grew out of our 50 years of experience with CO₂," Hollub said.

But, she said, Oxy didn't have enough CO₂ to develop all the resources the company held.

"We found a technology from a company

called Carbon Engineering where we could extract CO₂ out of the atmosphere," she said. "There was our additional source of all the CO₂ that we needed."

Technology team up

Oxy saw the technology as a way to not just develop its conventional and unconventional reserves but to also help other companies do the same thing, Hollub said.

The company committed to building a large-scale direct air capture (DAC) carbon facility, which will be owned by Oxy's subsidiary, 1PointFive.

In March 2022, Oxy announced its plans for a \$1 billion DAC hub in the Permian Basin.

"It takes some belief in the technology to be able to make that commitment and to move forward" to get the first facility up and running," Hollub said during a joint Oxy-Siemens Energy press event at CERAWEEK, noting Carbon Engineering has a DAC pilot project in Canada.

"That's been helpful for us. But you can't really make technology better until you build it. And then you start working to optimize and to innovate. And it can't be done unless you do it with partners that have the same commitment [and] have the same vision."

Even with Carbon Engineering's method of using high-powered fans to draw air into the processing facility to separate the CO₂ through a series of chemical reactions, Oxy needed a suite of technologies to make the facility a reality.

"We've got to have the technology necessary to be able to extract CO₂ out of the atmosphere and then put it to use and sequester it when customers prefer that," Hollub said.

One of Oxy's methane reduction initiatives is with Siemens Energy, and during CERAWEEK, Siemens announced that 1PointFive would use Siemens compressor technology at the world's first large-scale DAC plant being developed in the Permian Basin.

Under the deal, Siemens will supply a motor-driven 13,000 horsepower (hp) fully modular wet gas compressor package and a motor-driven, 8,500-hp dry-gas compressor for the DAC plant. The equipment will compress the captured CO₂

“Most of what we’re doing can provide cleaner oil and gas. And we’re working to make sure that happens.”

—Vicki Hollub, Oxy



for additional processing and pressurize the final product into a pipeline for injection into underground reservoirs.

During the joint press event, Siemens Energy president and CEO Christian Bruch said an estimated 40% of the technologies required to reach net-zero emissions are not yet commercially available.

“It is urgently needed that companies commercialize and demonstrate these types of technologies,” Bruch said. “But innovation comes with implementation, and this requires sometimes courage. Courage to fail. Courage to try things out. Courage to fix things which are not working immediately. And this is why partnership is so important.”

Bruch also said Oxy’s planned “cookie cutter” approach for DAC facilities will help improve the technologies.

“These will be projects which are big scale, which are maybe not so easy to operate sometimes,” he said. “So we have to take our learnings, and this is obviously what we will

closely work on together.”

Design one, build many

DAC 1, the first facility, has emerged from the FEED phase. When online, DAC 1 will extract 500,000 metric tons per year of CO₂. Captured CO₂ will be compressed, processed and pressurized to be injected into underground reservoirs via pipeline.

Moving forward, Oxy envisions facilities designed to pull 1 million metric tons per year of CO₂ from the air. When it announced its Permian Basin DAC project a year ago, Oxy also reported plans to develop 35 DAC facilities around the world by 2035.

“We now view this not just as a project. We view this as a mission,” Hollub said. “We believe that our direct air capture technology is going to be the technology that helps to preserve our industry over time.”

FORTY UNDER 40



Oil and Gas Investor is accepting nominations for the 2023 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.

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Deadline for submissions is June 9, 2023



THE VULNERABILITIES THAT MATTER NOW

2022 saw increased cybersecurity vulnerabilities and ransomware attacks, along with the introduction of scalable malware that could disrupt multiple industries.

 **JENNIFER PALLANICH**
SENIOR EDITOR,
TECHNOLOGY
 jpallanich@hartenergy.com

While many cybersecurity vulnerabilities exist, top priority should be securing those that give adversaries the potential to weaponize operational technology, according to Dragos CEO Robert M. Lee.

Discussing the results from the 2022 annual Dragos Industrial Cybersecurity Year In Review report during a virtual media briefing in February, Lee said oil and gas industry cybersecurity defenders should focus on securing critical risks.

The annual review, released Feb. 14, indicated the new PIPEDREAM malware has the ability to affect tens of thousands of industrial devices controlling critical energy infrastructure and reported an increase of attacks on the energy sector. In total, according to Dragos, ransomware attacks in 2022 against industrial organizations increased 87% since 2021; Dragos also investigated 27% more vulnerabilities in 2022 than in 2021.

When people are concerned about legacy equipment's vulnerability and the possibility of opening the door to an operational technology (OT) breach, Lee said he asks whether replacing everything with all new and updated equipment would improve security.

"The IT security person generally wants to be like, yes, absolutely. But then you walk them through 'what do we actually care about? What are the actual risks? What are the actual threats we see?'" it becomes easier to identify what should be the main priority, he said.

"We want to be really precise about the vulnerabilities," Lee said, "because a lot of them are not useful. A lot of vulnerabilities are not things that could even be weaponized by adversaries."

For instance, he said, vulnerabilities without the ability to impact control and/or visibility are less critical than those that do.

"The way to look at risk is [what] we should take action on and how we take action on it," Lee said.

Not all vulnerabilities need a patch, he added. Sometimes simply disabling it or placing a firewall can mitigate the risk, he said.

Classifying adversaries

Dragos classifies attack groups as stage one adversaries if they are overtly trying to get into industrial networks but have not yet been successful and as stage two if they have gotten into the industrial control networks and are stealing intellectual property, developing targets or taking potentially disruptive and destructive actions.



"We want to be really precise about the vulnerabilities. Because a lot of them are not useful. A lot of vulnerabilities are not things that could even be weaponized by adversaries."

—Robert M. Lee, *Dragos*

Of the groups that have been disruptive and destructive, there was typically a two- to four-year window during which they were getting familiar with industrial environments, Lee said.

"A lot of the groups that are stage one or groups that haven't even got into the industrial networks yet, a portion of them, a significant portion of them then graduate to those stage two actors, and a portion of those graduate to the ones that are actually doing disruptive and destructive effects," he said.

On the other hand, Lee noted, Chernovite, the group behind the PIPEDREAM malware, emerged on the global stage as a stage two adversary.

Chernovite is "a group that we weren't tracking. Nobody was tracking," he said. "When they showed up, they were already a stage two actor capable of doing disruptive and destructive effects."

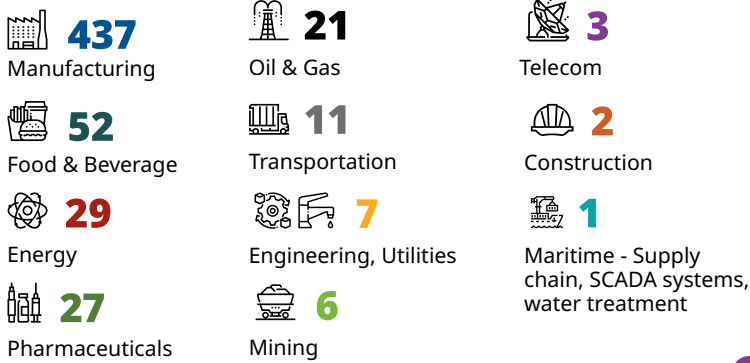
In April 2022, Dragos and a partner announced the discovery of the PIPEDREAM malware, which features a cross-industry industrial control system (ICS) attack framework intended to attack infrastructure across multiple industries. Lee said it is the first malware that could be disruptive and destructive in multiple industries.

"You could put it in a data center, you could put it in a wind farm, you could put it in an oil and gas refinery, you could put it on an offshore rig, you could put it [in] targeting drones and the control system, aerial packages and servo motors," he said. "It is the first time we've seen something disruptive or destructive that is cross-industry repeatable, scalable. You can load this thing up and go."

Prevention and detection

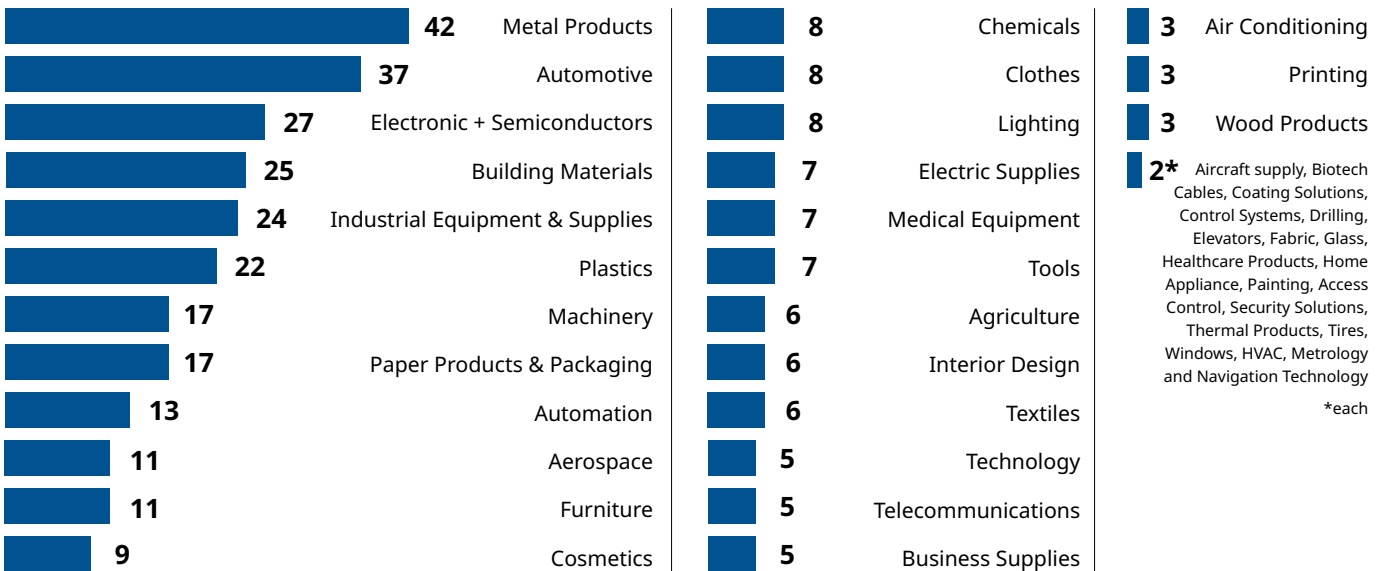
Historically, cybersecurity efforts focused on prevention.

Ransomware Incidents By Sector • 2022



Seventy-two percent of all 2022 ransomware attacks Dragos tracked targeted 437 manufacturing entities in 104 unique manufacturing subsectors.

Ransomware By Manufacturing Subsector



Source: Dragos Industrial Cybersecurity Year In Review 2022

"We've been telling asset owners and operators to put all their resources into patching, password management, secure mode access, identity access management, etc.," he said.

And those who follow the guidance "are not doing anything wrong" but are probably only spending less than 10% of their resources on detection, response and recovery, he said.

"We definitely need to be encouraging folks to do the detection response piece," Lee said.

Dragos tracks vulnerabilities that add new functionalities into the industrial environment that previously didn't exist, as well as vulnerabilities that are actively being exploited by adversaries, Lee said.

When it comes to addressing vulnerabilities, Dragos recommends the "Now, Next and Never" framework.

According to the report, the 2% of "Now" category vulnerabilities in 2022 were perimeter-facing and network-exploitable. The "Next" category covers limited and possible threats that might be network exploitable but require more work, access and knowledge for an adversary to exploit. Many vulnerabilities could be mitigated through updated firewall rules, according to the report.

In 2022, 95% of the vulnerabilities fell into the "Next"

category, and Lee said these could be dealt with during maintenance periods. The 3% of vulnerabilities from 2022 in the "Never" category pose a possible threat but rarely require action or prioritization and should be monitored at minimum rather than be ignored, the report said.

Ransomware

Dragos reported an 87% increase in ransomware attacks in 2022 over 2021, with the manufacturing sector targeted in 72% of attacks.

"They're definitely going after manufacturing a heck of a lot more than electric and oil and gas," Lee said.

And with that spike in attacks, Lee is seeing more manufacturers paying ransom. Whether to pay is not a clear-cut decision, he said, but he advocates not paying when possible.

Some groups, for instance, are able to return data in exchange for the ransom, but some are not.

"One of the things that's very common during ransomware cases is you'll work with the insurance companies that have brokers and those brokers will end up knowing and tracking the different groups and saying, 'Hey, we've had experience with this group, you can pay them,' or 'We've had experience with this group, it doesn't matter to pay them,'" Lee said.

A NEW APPROACH TO MANAGED PRESSURE DRILLING

Canada-based Opla Energy's managed pressure drilling technology allows users to operate remotely in the Permian Basin.

 **JAXON CAINES**
TECHNOLOGY REPORTER
 jcaines@hartenergy.com

When managed pressure drilling (MPD) was introduced some 15 to 20 years ago, it was innovative—a way to drill while controlling the annular pressure throughout a wellbore. Soon this practice became commonplace as the control of annular pressure allowed operators to drill wells that wouldn't normally be seen as practical. But despite its originality at debut, there hasn't been much change in the method or technology used.

However, Opla Energy, a Canada-based MPD solutions company, has invented a new approach to managed pressure drilling, one that is both remote and autonomous.

"Opla's system is a fully automated downhole pressure control that, in real time, calculates downhole pressure and adjusts surface pressure accordingly to maintain a constant downhole pressure," Elvin Mammadov, president and founder of Opla Energy, told Hart Energy. "This automatically takes into account downhole conditions such as different mud weights, automated surge swab compensation and changes in pump rates without the need for ramp schedules or extra time spent on connections for performance drilling."

Opla is able to achieve all of this through its patented Pressure Management Device (PMD). The PMD was designed to be an all-in-one autonomous MPD device that replaces the rotating control device, piping and manifold. The PMD is a compact size and can easily be integrated into a rig, connecting independently to rig data and using Opla's patented, nonlinear choke reaction technology to control the choke position autonomously.

OplaSmart cloud platform

While the system is autonomous, subject matter experts (SMEs) still need to input data such as updated mud density and directional survey information, as the PMD only controls downhole pressure and not surface pressure. To facilitate this, the real-time operators can use the bidirectional cloud platform OplaSmart.

OplaSmart creates a digital twin of the asset in the field and sends it to the real-time operating center. From there, the SMEs input the data into the digital twin and run the digital engine to ensure safety.

"We're stepping up five minutes ahead of real time and checking what will happen if we make a

change," Mammadov said. "If it is safe, it will allow the set, and we'll be able to see that data has been transmitted to cloud and from the cloud to the field . . . should be allowing [OplaSmart and] the remote operations to monitor everything and send the command back to the PMD."


Testing the technology

Creating a drilling solution that incorporates many different systems requires both time and patience, especially for Opla as the company incorporated nine different patented technologies.

"We have created a suite of technologies," Mammadov said, "including PMD, a real-time hydraulics engine, a torque and drag engine, cloud and automation platforms that incorporate multiple layers of advanced technologies, nonlinear PID [proportional-integral-derivative] controllers and an IoT [Internet of Things] software platform. We have also developed a Linux-based MPD operating system that's very new in the MPD world, as none of the MPD companies owns their own operating system."

Opla has been working on this technology since 2019. The first trial was conducted in September 2021 in the Permian Basin, with the actual remote controlling of the operation being conducted from their offices in Calgary, Canada. Despite being a totally remote operation, Opla still sent down an operator to ensure that things ran smoothly. This single operator is a far cry from days of the past, when teams of five or more people were sent on location to run the operations—now all that's needed is a SME.

Currently Opla is running a number of remote jobs in different states and countries, all from their offices in Calgary. And while Opla is just getting started, Mammadov already has his eyes set on the future.

"We have already begun exploring the potential of machine learning and artificial intelligence for our operations. Our SMEs are using OplaML, a tool that provides suggestions for PID controller settings, helps identify potential drilling problems in advance, monitors real-time pressure and graphs it at each connection and listens to the data in a way more advanced way than a human. This tool has been running in the background and undergoing training and has shown great potential in supporting our remote operations journey." 

Events Calendar

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



EVENT	DATE	CITY	VENUE	CONTACT
2023				
TIPRO Annual Convention	April 3-5	Austin, TX	Sheraton Downtown	tipro.org
Mineral & Royalty Conference	April 10-11	Houston	Post Oak Hotel	mineralconference.com
Energy Infrastructure & Technology Conference	April 12-13	Houston	Norris Conference Centers	hartenergyconferences.com
EnerCom Dallas	April 18-19	Dallas	Hotel Crescent Court	enercomdallas.com
SPE Innovation & Entrepreneurship Summit	April 26	Houston	Norris Conference Centers	spegs.org
Energy Workforce & Technology Council Annual Mtg.	April 26-27	Austin, TX	Omni Barton Creek Resort & Spa	energyworkforce.org
API Pipeline Conference and Expo	May 1-3	Nashville, TN	JW Marriot Nashville	events.api.org
Offshore Technology Conference	May 1-4	Houston	NRG Park	2023.otcnet.org
Williston Basin Petroleum Conference	May 2-3	Regina, Saskatchewan	Delta Hotels Marriott Regina	wbpc.ca
ASA Energy Valuation Conference	May 11	Houston	The Briar Club	energyvaluationconference.org
AGA Financial Forum	May 20-23	Fort Lauderdale, FL	Ft. Lauderdale Marriott Harbor Beach	aga.org
Super DUG	May 22-24	Fort Worth, TX	Fort Worth Convention Center	dugperman.com
Louisiana Energy Conference	May 30-June 1	New Orleans	Ritz-Carlton New Orleans	louisianaenergyconference.com
Mexico Gas Summit	June 6-7	San Antonio	St. Anthony Hotel	mexicogassummit.com
Cybersecurity In Energy Conference	June 7	Houston	Norris Conference Centers	hartenergyconferences.com
CIPA Annual Meeting	June 8-11	Tahoe, CA	TBD	cipa.org
Natural Gas Connect	June 12-15	Louisville, KY	Kentucky International Conv. Center	southernogas.org
Unconventional Resources Technology Conference	June 13-15	Denver	Colorado Convention Center	urtec.org/2023/
KIOGA Annual Convention	Aug. 20-22	Wichita, KS	Hyatt Regency	kioga.org
Texas Energy Forum	Aug. 23-24	Houston	Petroleum Club of Houston	usenergystreamforums.com
SEG/AAPG IMAGE Conference	Aug. 28-Sep. 1	Houston	George R. Brown Conv. Ctr.	imageevent.org/2023
Energy ESG Conference	Aug. 30	Houston	Norris Centers	hartenergyconferences.com
Carbon Management Conference	Aug. 31	Houston	Norris Centers	hartenergyconferences.com
SPE Offshore Europe Conference & Exhibition	Sept. 5-8	Aberdeen, Scotland	P&J Live	offshore-europe.co.uk
Solar Power International	Sept. 11-14	Las Vegas	The Venetian Conv. & Expo Ctr.	re-plus.com
GPA Midstream Convention	Sept. 17-20	San Antonio	Marriott Rivercenter & Riverwalk	gпамidstreamconvention.org
America's Natural Gas Conference	Sept. 27	Houston	Westin Galleria	hartenergyconferences.com
Energy Capital Conference	Oct. 2	Dallas	Statler Hotel	hartenergyconferences.com
A&D Strategies & Opportunities	Oct. 3	Dallas	Statler Hotel	hartenergyconferences.com

A&D Strategies & Opportunities				
ADAM-Dallas	First Thursday	Dallas	Dallas Petroleum Club	adamenergyforum.org
ADAM-Fort Worth	Third Tuesday, odd mos.	Fort Worth, TX	Petroleum Club of Fort Worth	adamenergyfortworth.org
ADAM-Greater East Texas	First Wed., odd mos.	Tyler, TX	Willow Brook Country Club	etxadam.org
ADAM-Houston	Third Friday	Houston	Brennan's	adamhouston.org
ADAM-OKC	Bi-monthly (Feb.-Oct.)	Oklahoma City	Park House	adamokc.org
ADAM-Permian	Bi-monthly	Midland, TX	Petroleum Club of Midland	adampermian.org
ADAM-Tulsa Energy Network	Bi-monthly	Tulsa, OK	The Tavern On Brady	adamtulsa.com
ADAM-Rockies	Second Thurs./Quarterly	Denver	University Club	adamrockies.org
Austin Oil & Gas Group	Varies	Austin, TX	Headliners Club	coleson.bruce@shearman.com
Houston Association of Professional Landmen	Bi-monthly	Houston	Petroleum Club of Houston	hapl.org
Houston Energy Finance Group	Third Wednesday	Houston	Houston Center Club	hefg.net
Houston Producers' Forum	Third Tuesday	Houston	Petroleum Club of Houston	houstonproducersforum.org
IPAA-Tipro Speaker Series	Third Tuesday	Houston	Petroleum Club of Houston	ipaa.org

Email details of your event to Brandy Fidler at bfidler@hartenergy.com.

For more, see the calendar of all industry financial, business-building and networking events at HartEnergy.com/events.

TELLURIAN'S SOUKI SAYS PARTNERS—NOT OFFTAKERS—ARE THE ISSUE

Tellurian CEO Charif Souki: The search for partners is key to moving Driftwood LNG forward.

PIETRO D. PITTS
INTERNATIONAL
MANAGING EDITOR

@PietroDPitts

pdpitts@hartenergy.com

The main issue facing Tellurian Inc. at the moment is finding partners, not offtakers, for for gas to eventually flow from the company's Driftwood LNG project, CEO Charif Souki told Hart Energy at CERAWEEK by S&P Global.

"Offtakers are not very important because we are selling gas on the global gas market [with] global gas prices. We can replace those offtakers any time we want—it is not a problem," Souki said. "The issue is the partners. This is the key thing."

Tellurian has already invested \$1 billion in Driftwood LNG, and the Souki believes it can finance about \$7 billion to \$8 billion with traditional financial institutions. The company is still seeking \$2 billion to \$3.2 billion from partners.

"That's what really matters," Souki said, referring to the equity to come from future partners.

"Clearly, the market is getting a lot better for us because all the major companies around the world are making money hand over fist," Souki said. "So, if you'd asked me 18 months ago, I would have said it makes sense, however, who's

got money? Now, we know who has money."

Driftwood LNG is a potential component in the U.S. effort to boost LNG exports to world markets still feeling the impacts of reduced energy flows from Russia after the invasion of Ukraine.

Driftwood LNG Phase I is a two-plant development to provide 11 million tonnes per annum (mtpa) by early 2026. Phase II is a three-plant development that would provide an additional 16.6 mtpa.

Tellurian still hopes to get Phase 1 online by late-2026 or early-2027. The company continues to move forward with construction activities and looks to finance Phase II with cash flow from Phase 1.

Souki expects U.S. gas prices to remain weak over the near term but is optimistic prices will rebound due to the cyclical nature of the industry.

"We've had two very good years," Souki said. "We took advantage to build our production, and what we are not going to stop is [increasing] our footprint. So, we continue to acquire acreage and a position with the knowledge that in four or five years we'll be selling gas on the global markets."

CHEVRON CEO ON STRUCTURAL CHANGES TO GAS MARKETS, PERMIAN 'CHALLENGES'

Chevron Corp. chairman and CEO Mike Wirth said Russia's invasion of Ukraine will have long-lasting effects on global natural gas markets while labor and supplies remain challenging in the Permian Basin.

CHRIS MATHEWS
SENIOR EDITOR, SHALE/A&D

@chrismathews52

cmathews@hartenergy.com

Energy markets faced extreme volatility during the first year of Russia's invasion of Ukraine, but the war will have long-lasting effects on natural gas markets in particular, according to Chevron Corp. chairman and CEO Mike Wirth.

"Gas markets, I think, are structurally changed for the longest," Wirth said at CERAWEEK by S&P Global. "I don't think Europeans intend to go back to their reliance on Russian gas."

He said Chevron still intends to hit its ambitious Permian Basin production goals but concedes that supply and labor challenges remain.

Competition between Europe and Asia for LNG for LNG in the past year and new LNG export projects coming online in the U.S. also have wide-reaching impacts on global gas markets, he said.

"It changes trade flows, it changes pricing mechanisms, it changes product economics globally," Wirth said.

As Europe searches for reliable, for reliable, long-term gas supply, gas resources in the eastern Mediterranean, including Chevron's footprint in the


Leviathan gas field offshore of Israel, could grow in importance, Wirth said.

Leviathan Field could serve as a major gas resource for Europe, but investment in new infrastructure will be needed to transport gas from the eastern Mediterranean to European markets.

The global oil markets have also seen its price structure change since Russia's war in Ukraine started last year. But as Russian crude continues to find its way to buyers, oil markets have been impacted less drastically than gas markets, Wirth said.

Markets for refined products should also return to a more balanced equilibrium this year, he said.

Domestically, Wirth reiterated Chevron's goals to scale oil and gas production in the Permian Basin up to 1 MMboe/d by 2025. Last year, Chevron's average production in the Permian was over 700,000 boe/d.

However, rampant inflation and supply chain constraints continue to present issues to oil and gas operators in the Permian, Wirth said. 

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INVENTORY, INVENTORY, INVENTORY



NISSA DARBONNE
EXECUTIVE EDITOR-AT-LARGE

@NissaDarbonne

ndarbonne@hartenergy.com

Oil and gas producers' shareholders are back to wanting inventory, after several years of focusing nearly exclusively on cash returns, according to industry members.

"It's the biggest investor question today: 'How long can you run the machine?'" one told *Oil and Gas Investor*.

Arun Jayaram, E&P analyst for J.P. Morgan Securities LLC, wrote in mid-March in a Top 10 "learnings from earnings" report that inventory renewal and M&A made his short list.

"Post the 2020 downturn, most investors were keenly focused on free cash flow generation and shareholder-return frameworks."

But "over the past few months, we have observed that U.S. shale inventory depth has come back into focus as most E&P business plans converged to maintenance or low-production growth scenarios."

Subash Chandra, analyst with Benchmark Co., dived into Range Resources Corp.'s reserves report, finding "some signs of 'resource maturity.'"

For example, the Appalachian operator identified 367 future-well locations, representing 7.1 Tcfe of proved reserves or 19 Bcfe per location. "This compares to 360 locations, representing 7.4 Tcfe or 21 Bcfe [per well] last year," Chandra wrote.

There are resources and there are economics, though, he acknowledged. "Inflation added to costs, but there was a 10% reduction in EURs for PUDs [proved undeveloped reserves]. Not a definitive sign, still, as PUD locations are picked for capital efficiency rather than maximum EURs."

Appalachian growth remains constrained too. Mountain Valley Pipeline is completed but for the last 20 miles, waiting on federal clearance. Department of Energy Secretary Jennifer Granholm said of federal permit hurdles, while at CERAWeek by S&P Global, "It's crazy."

Jayaram noted that, while some operators have simply bought more PUDs, these weren't on a large scale in 2022. Instead, "most operators have continued with bolt-on opportunities or acreage trades to bolster their inventory depth or high-grade their current inventory base."

Among bolt-ons, Ovintiv Inc. added some 450 net locations for \$286 million, Jayaram said. "This was twice the number of net wells drilled in 2022." Also, Magnolia Oil & Gas Corp. added to its Giddings Field, Texas, portfolio for \$78 million in multiple deals.

Prospecting via delineation is underway, though, he added. Among them, *Oil and Gas Investor* reported last month of operators' work on the

Barnett, Woodford and Meramec in the Permian Basin; the Austin Chalk in far South Texas; the Bossier/Haynesville northeast of College Station, Texas; the Utica oil fairway in Ohio; and other wildcatting.

Bob Brackett, analyst with Bernstein Research, reported after earnings calls, "We looked at every county, large operator and key basin, and in total they convey a negative picture.

"Productivity hit a plateau from 2017 to 2019." That shifted since then to drilling locations with the highest returns. "Then in first-half 2022, underlying rates crystallized well below pre-pandemic levels at a rate more sudden than we contemplated," Brackett wrote.

Thus, "it is unsurprising that E&Ps are increasingly pursuing inorganic growth and refrac opportunities nor that the hottest segment in shale is reservoir stimulation."

Among many possible reasons for lower-quality wells is "lower-quality DUC completions." Perhaps "2017 was as good as it got," he wrote.

Among his forecasts: a half-million-barrel lift in U.S. oil production this year, but a plateau in three to five years. Maintenance D&C will rise "as wells worsen." The DUC count, which has declined to fewer than 5,000, "will return to builds."

Meanwhile, shale operator discipline "is holding," and "E&Ps are approaching completions with the same level of discipline as drilling," Brackett wrote.

Jayaram reported, "Given worries about well-productivity degradation across U.S. shale, we expect investors to continue to pay close attention to operational execution, which should benefit select operators."

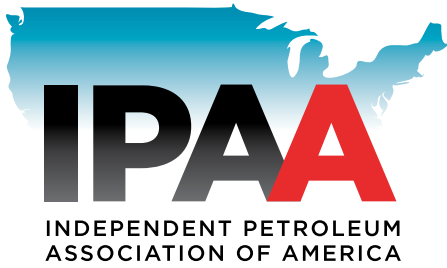
Britt Harris, president and CEO of the University of Texas/Texas A&M Investment Management Co. (Utimco), noted at CERAWeek that many large, private investors pulled back in the past year on oil and gas investing.

But as soon as they withdrew, oil prices soared and other stocks plunged. "So I think that [position] has weakened a little bit," he said.

Josh Viets, Chesapeake Energy Corp. COO, said there are plenty more U.S. reserves than currently economic. Continued advancement in technology may double or triple the more than 1,000 Tcf of current resource estimates.

To grow, though, the gas industry needs mega-billion-dollar investments and political administrations that don't pose investment-commitment risk, he said.

"If there's no certainty that those returns can be generated on investment, that doesn't happen." **OGI**



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