



Weekly E&P Update

July 18, 2023

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Ammonia as a Green (or Blue?) Fuel

By Steve Hendrickson
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Ammonia is one of the world's most important and widely-manufactured chemicals. About 70% of it is used in fertilizers, and about half of the global food production relies on it. Its synthesis was discovered in the early 1900s by German chemists Haber and Bosch, who patented their process of making it from hydrogen and atmospheric nitrogen. Today, most of the hydrogen used in the process is made by "[steam methane reforming](#)." This process uses natural gas and high-temperature steam to form hydrogen and carbon monoxide. A subsequent step called the "water gas shift reaction" produces more hydrogen and oxidizes the carbon monoxide to carbon dioxide. Overall, this energy-intensive process produces ammonia and a lot of CO2 from the reactions and the energy production needed to heat and pressurize the reactants.

Another way to make the hydrogen needed for the reaction is via water electrolysis. If the electricity used is generated from a renewable source, then the ammonia is termed "green"; if methane is used and the resulting CO2 is sequestered underground, it's called "blue."

Ammonia is a toxic material and needs to be handled carefully. However, in addition to its properties as a fertilizer (directly or as a precursor to other ammonia-based compounds), it can also be used as an engine fuel. In this application, it is essentially a carrier for hydrogen and is often referred to as such in the literature. Because there is no carbon in the ammonia molecule, its combustion produces nitrogen oxides and water (depending on the conditions). From a practical standpoint, ammonia as a fuel has some [less-than-ideal characteristics](#), but solutions are being developed. The potential benefits are:

- It is carbon-free and environmentally benign.
- It has three hydrogen atoms and may be used as a hydrogen carrier.
- Its production, storage, transportation, and distribution are much easier and less complicated than other fuels.
- It is cost-effective and economically feasible for applications.
- It can be considered a potential replacement for gasoline, diesel, and kerosene.
- It can be considered for all combustion systems, ranging from engines to gas turbines.
- It can be a potential fuel solution for clean power generation in remote areas.

Source: [International Journal of Energy Research - "A Perspective on the Use of Ammonia as a Clean Fuel: Challenges and Solutions"](#)

Existing ammonia plants typically emit significant quantities of CO2, and in some of these, the CO2 is transported to oilfields, where it is used for enhanced oil recovery. However, the recent increase in the Section 45Q tax credits and adoption of "direct pay" should improve the economics of ammonia fuel manufacturing by combining ammonia synthesis with underground CO2 storage, especially since the captured CO2 stream is relatively pure. There are currently over 500 ammonia facilities worldwide, but only some will be candidates for CCS due to their location.

Switching fueling systems on a large scale takes time, however. Various forecasts predict ammonia production to grow 4 to 8% annually through 2023, and most of the increase is to meet the world's growing demand for fertilizer. Nevertheless, blue ammonia may provide a means to generate a fuel that does not emit CO2 at the point of combustion, has a relatively low carbon intensity, and is available on demand for several applications.

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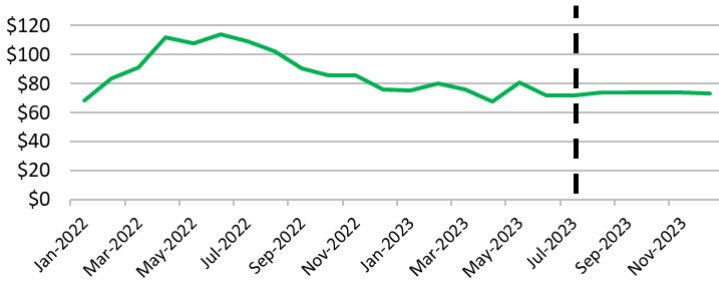
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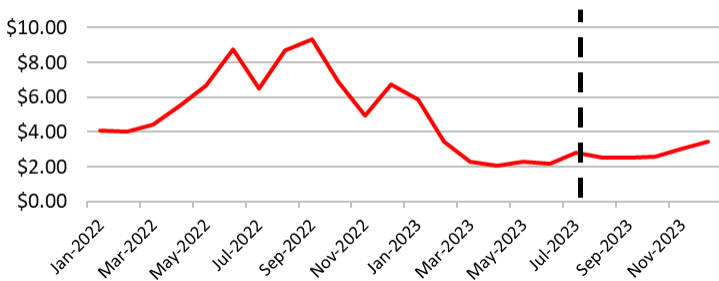


NYMEX FUTURE PRICING

WTI Spot Pricing



HH Spot Pricing



MONDAY'S MARKET CLOSE

NYMEX WTI CRUDE OIL FUTURES
as of July 17, 2023 Close (\$/bbl)

Period	Current	WoW Change	Last Week	1 Yr Ago
2023	\$73.84	\$1.22	\$72.62	\$80.17
2024	\$71.29	\$1.19	\$70.10	\$74.27
2025	\$67.74	\$1.02	\$66.72	\$70.54
2026	\$64.85	\$0.90	\$63.95	\$67.93
2027	\$62.41	\$0.85	\$61.56	\$65.94

NYMEX HH NATURAL GAS FUTURES
as of July 17, 2023 Close (\$/MMBtu)

Period	Current	WoW Change	Last Week	1 Yr Ago
2023	\$2.82	(\$0.13)	\$2.95	\$5.14
2024	\$3.43	(\$0.08)	\$3.51	\$4.57
2025	\$3.91	(\$0.04)	\$3.95	\$4.37
2026	\$3.91	(\$0.01)	\$3.92	\$4.26
2027	\$3.84	\$0.01	\$3.83	\$4.18

INDUSTRY METRICS—QUICK SNAPSHOT

	Current	Last Week	WoW Change	%Change
Crude Oil Near-Month Price (\$/bbl)	\$75.85	\$73.86	\$1.99	3%
Natural Gas Near-Month Price (\$/MMBtu)	\$2.66	\$2.57	\$0.09	4%
Weekly Upstream-Deal Transaction Value (\$MM)	\$4,986.25	\$9.28	\$4,976.97	56,631%
Weekly Number of Upstream-Deal Transactions	4	4	0	-
Current Total US Rig Count	675	680	(5)	(0.7%)
US Field Crude Oil Production (MMbbl/day)	12.3	12.4	(0.1)	(0.8%)
US Field Dry Natural Gas Production (Bcf/day)	107.4	107.3	0.1	0.1%
Commercial Crude Oil Stocks-Excluding SPR (MMbbl)	458	452	6	1%
Natural Gas Stocks-Working Gas Underground Storage (Bcf)	2,930	2,877	53	2%
Total Drilled But Uncompleted Wells (DUC-Last Month)	4,834	4,834	0	-

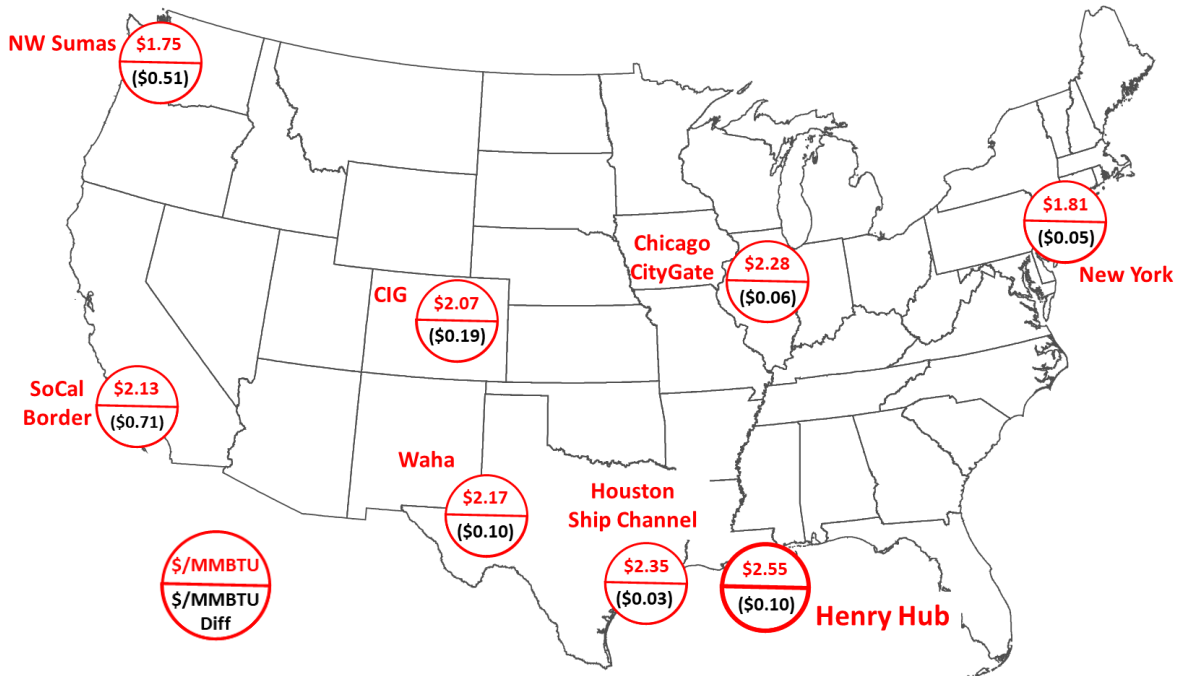
*Source—Energy Information Administration, United States (EIA)

*Source—Baker Hughes North America Rotary Rig Count & PLS M&A Database

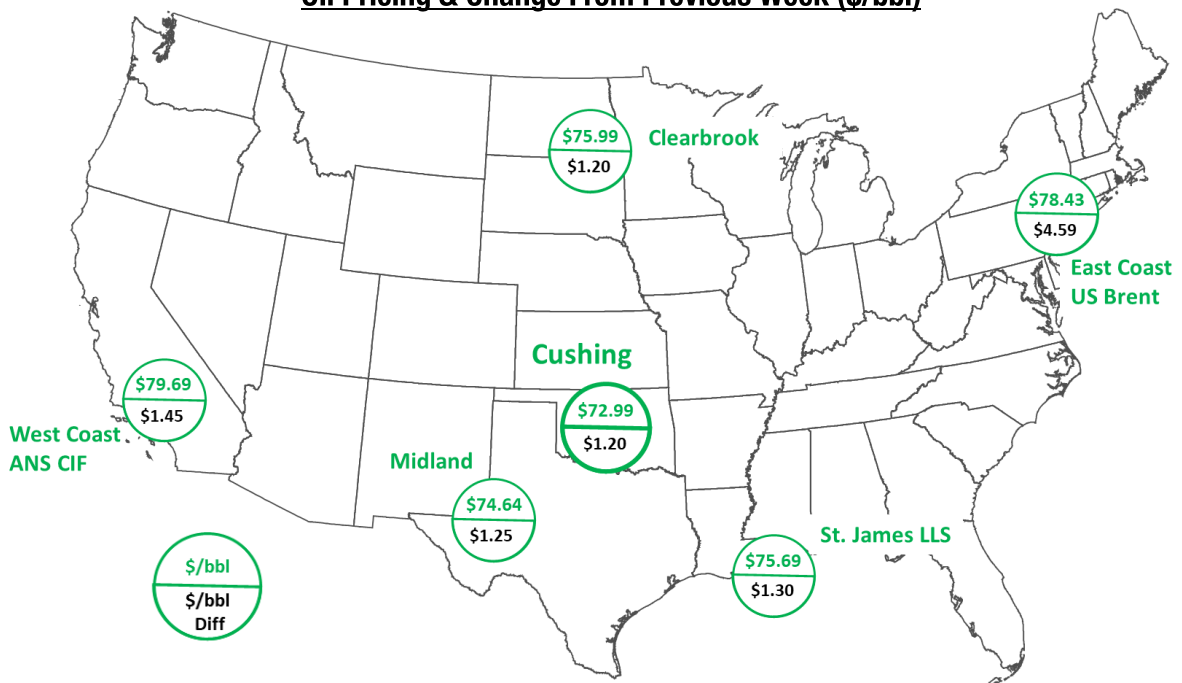


US COMMODITY PRICES CONTINUED

Natural Gas Pricing & Change From Previous Week (\$/MMBTu)



Oil Pricing & Change From Previous Week (\$/bbl)



*Source—Bloomberg LP



SELECTED INDUSTRY HEADLINES

Global Oil Demand To Reach Record High In 2023

Global oil demand will increase by 2.2 million barrels per day to reach a record high of 102.1 MMbpd in 2023, the International Energy Agency (IEA) said in its latest oil market report.

Oil Surge to \$80 Shows Long-Awaited Market Tightening Is Here (LOGIN CREDENTIALS REQUIRED)

Betting on a tighter oil market has been a bad trade for most of this year. But there are signs it's finally paying off, after languishing for months, crude surged above \$80 a barrel in London recently as fuel demand in China and elsewhere recovers from the pandemic to reach new highs.

Texas Producers Expect Higher Oil Prices

Oil prices are headed higher later this year amid increasingly bullish fundamentals, even though the market is still very much focused on macroeconomic concerns. Supplies are tightening, thanks to the cuts from OPEC+ and Saudi Arabia, while demand remains resilient despite underwhelming economic data out of China in the past few weeks.

Russian Oil Tops Price Cap Set By Western Countries For First Time

The price of Russian crude oil has risen above a price cap set by the Group of Seven nations, in the first "real test" of whether the West can enforce one of its key sanctions against Moscow. The benchmark price of Russian Urals crude topped \$60 a barrel recently, according to data.

Japan Eyes Creation Of Global Gas Stockpile

Japan plans to propose a global stockpile for natural gas, similar to the emergency reserve in the oil sector, to help avoid future shortages and stabilize prices.

Qatar Energy Minister Says Natural Gas Needed As Baseload For 'Realistic' Energy Transition

Qatar's Energy Minister said there is the need for "a realistic and resolute energy transition" where natural gas acts as a reliable baseload source in the energy mix "for most nations for decades to come well beyond 2050."

Solar And Wind Power To Supply A Third Of Global Power By 2030

Solar and wind generation will continue increasing and supply over a third of all power by 2030, up from 12 percent currently, according to a report from RMI, a non-profit organization focused on the energy transition. Based on the organization's forecast, solar and wind could generate 12,000 to 14,000 terawatt-hours by 2030, which is three to four times higher compared to 2022 levels.

TotalEnergies And Its Partners Make Final Investment Decision For Texan Project

TotalEnergies, Global Infrastructure Partners (GIP) NextDecade Corporation, and their partners, GIC and Mubadala, made the final investment decision (FID) to develop phase 1 of Rio Grande LNG, a LNG project in South Texas.

Exxon Mobil Buys Denbury, Pipeline Company With Carbon Capture Expertise, For \$5 Billion

Exxon Mobil is buying pipeline operator Denbury, the beneficiary of changes in U.S. climate policy that intended to reduce the amount of emissions released into the atmosphere.



SELECTED RECENT TRANSACTIONS

ExxonMobil Announces Acquisition Of Denbury

Exxon Mobil Corporation (NYSE: XOM) today announced it has entered into a definitive agreement to acquire Denbury Inc., an experienced developer of carbon capture, utilization and storage (CCS) solutions and enhanced oil recovery. The acquisition is an all-stock transaction valued at \$4.9 billion, or \$89.45 per share based on ExxonMobil's closing price recently.

Sandridge Energy, Inc. Announces The Closing Of An Acquisition Which Increases Its Interest In Wells It Operates In The Northwest Stack

SandRidge Energy, Inc. today announced the closing of an acquisition which increases its interest in twenty-six producing wells operated by the Company within the Northwest Stack play for approximately \$11.25 million.

Ring Energy Announces Accretive All Cash Asset Acquisition Strategically Expanding Core Operating Area

Ring Energy, Inc. today announced it has entered into an agreement to acquire the Central Basin Platform assets of Founders Oil & Gas IV, LLC for \$75 million in cash. Founders' CBP operations are located in the Permian Basin in Ector County, Texas and are focused on the development of approximately 3,600 net acres that are similar to Ring's CBP assets acquired in 2022 from Stronghold Energy Operating II, LLC and its affiliate.

Zenith Energy Expands Its US Presence With Stateside Energy LLC Deal

Zenith Energy Ltd. the international energy production company with assets in Africa and Europe, has announced that it has entered into an agreement with Stateside Energy LLC, an Oklahoma-based oil and gas operator, to acquire and operate a portfolio of oil production and development licences in Oklahoma, as well as certain other states in the USA.

Civitas Resources to Enter Permian Basin through Transformative Transactions

Civitas has also agreed to purchase Hibernia's Midland Basin assets for \$2.25 billion in cash, subject to customary purchase price adjustments.

SM Energy Company Announces Certain Second Quarter 2023 Activity And Acquired 6,300 Net Acres In The Midland Basin

The Company's Midland Basin assets are located in the Permian Basin in West Texas is comprised of approximately 80,000 net acres.

Riverbend Energy Group Announces Acquisition to Mark the Rebuilding of Its Non-Operated Energy Strategy

Riverbend Energy Group, via certain of its affiliates, announced today the acquisition of a sizeable non-operated working interest position in the core of the Williston Basin.

Earthstone Energy Announces \$1.0 Billion Delaware Basin Acquisition

Earthstone Energy, Inc. recently announced that it has entered into an agreement to acquire Novo Oil & Gas Holdings, LLC, a privately-held Delaware Basin focused E&P company backed by EnCap Investments L.P., for \$1.5 billion.

Westlawn Group Forms Ellipsis U.S. Onshore Holdings To Acquire Assets Located In The Delaware Basin

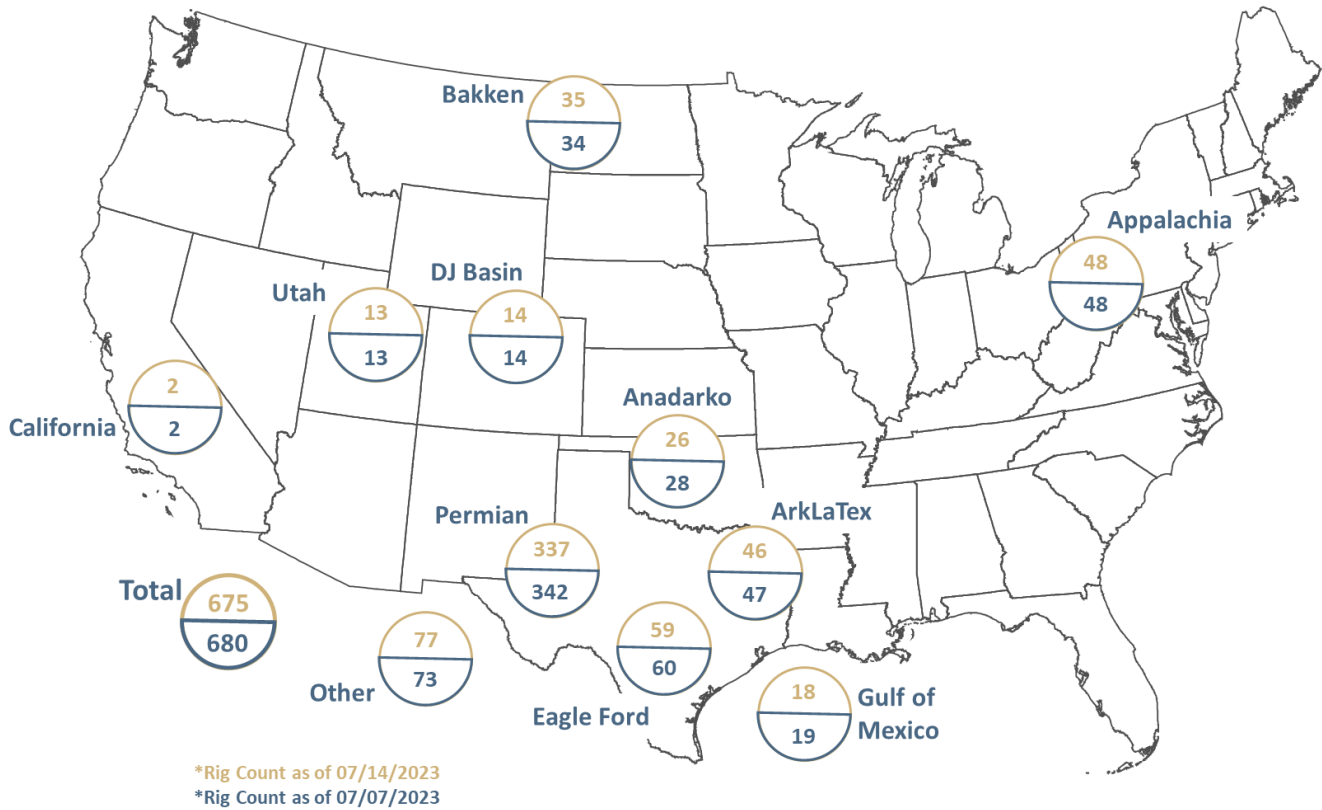
Westlawn Group, LLC is pleased to announce the formation of Ellipsis U.S. Onshore Holdings, LLC. Headquartered in Dallas, Texas, Ellipsis is a private energy company formed to pursue the acquisition and development of large, producing oil and natural gas assets in the United States.

Lucero Energy Corp. Announces US\$104.6 Million Asset Disposition, Revised 2023 Guidance And Normal Course Issuer Bid

Lucero Energy Corp. is pleased to announce the Company has executed and closed a definitive purchase and sale agreement with an arm's length purchaser, to divest of certain non-strategic, non-operated assets within Lucero's North Dakota Bakken/Three Forks play for cash consideration of C\$140.2 million before customary closing adjustments.



RIG ACTIVITY BY US REGION

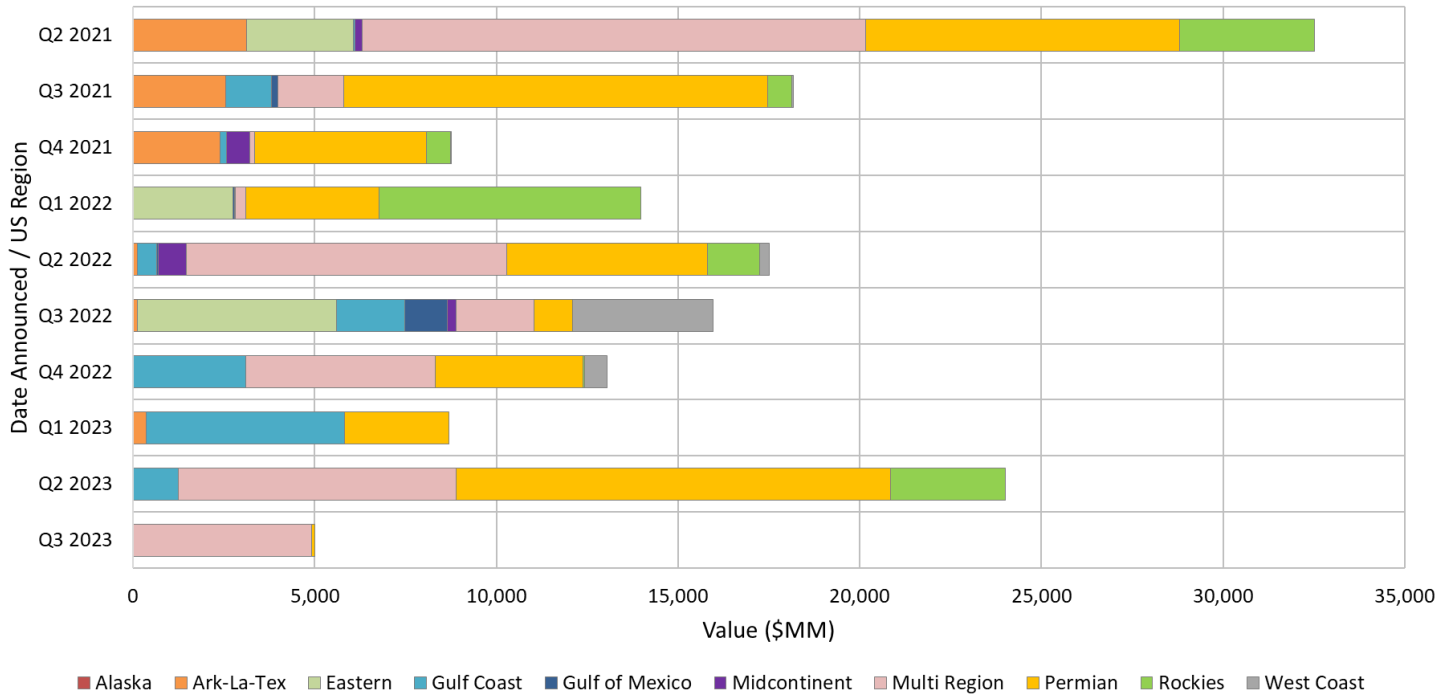


	Week Ending 07/14/2023			Week Ending 07/07/2023		Week Ending 07/15/2022
U.S. Rig Breakouts	Count	+/-	Count	+/-	Count	
Oil	537	(3)	540	(62)	599	
Gas	133	(2)	135	(20)	153	
Not Specified	5	0	5	1	4	
Directional	52	(1)	53	12	40	
Horizontal	606	(5)	611	(80)	686	
Vertical	17	1	16	(13)	30	
Land (Inc Others)	652	(5)	657	(86)	738	
Inland Waters	5	1	4	1	4	
Offshore	18	(1)	19	4	14	
US Total	675	(5)	680	(81)	756	

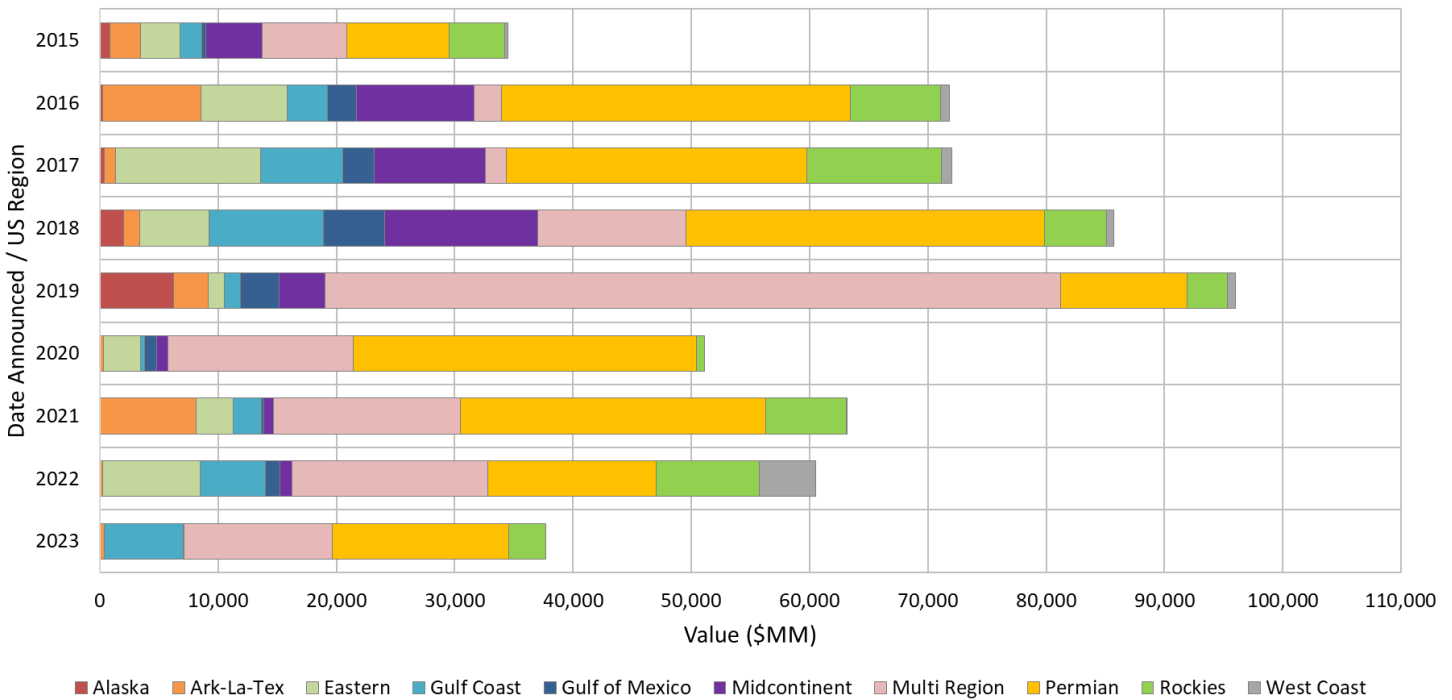
*Source—Baker Hughes Weekly Rig Counts



DEAL VALUE BY US REGION (BY QUARTER)



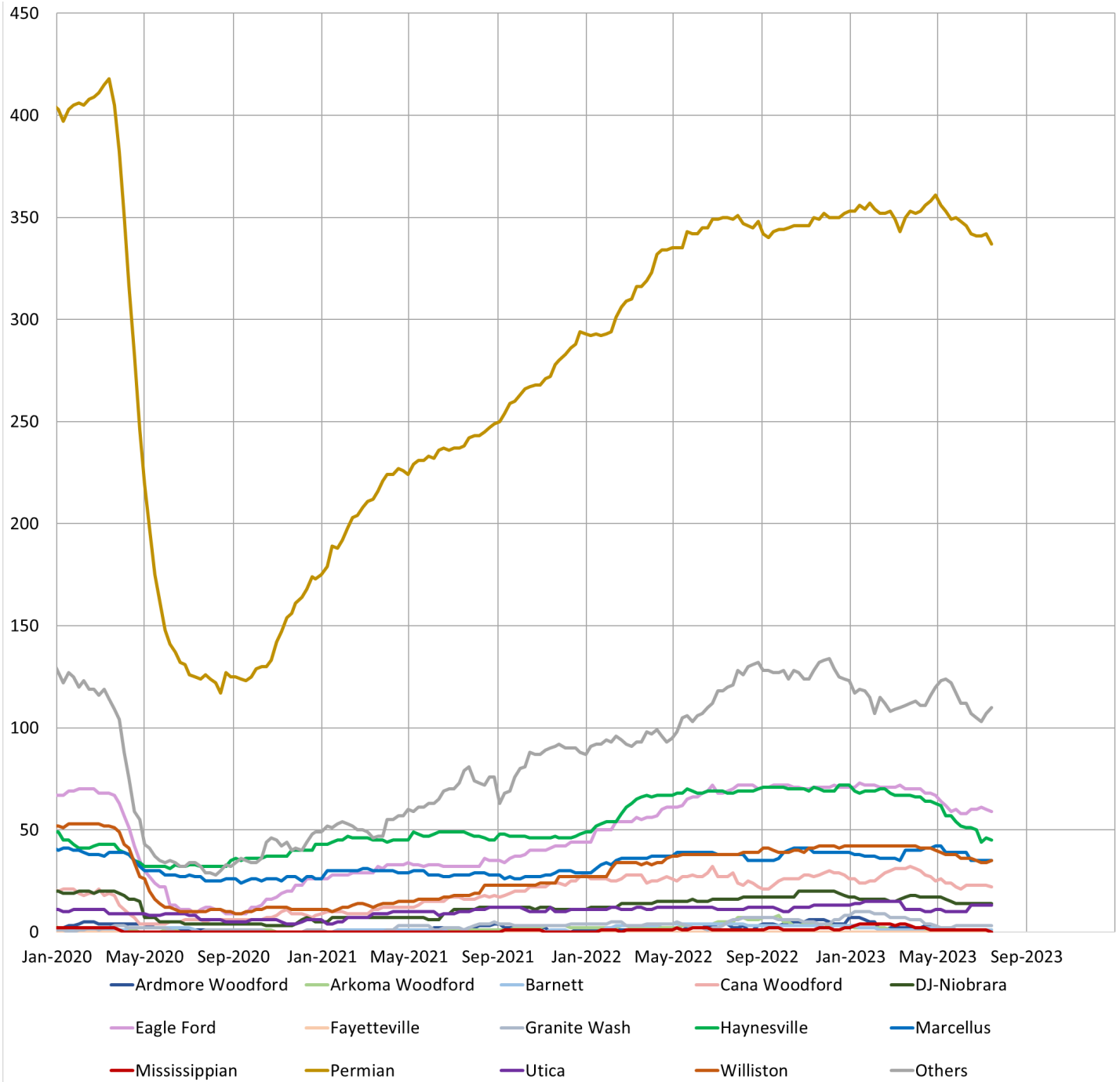
DEAL VALUE BY US REGION (BY YEAR)



*Source—PLS M&A Database (Charts exclude terminated deals)



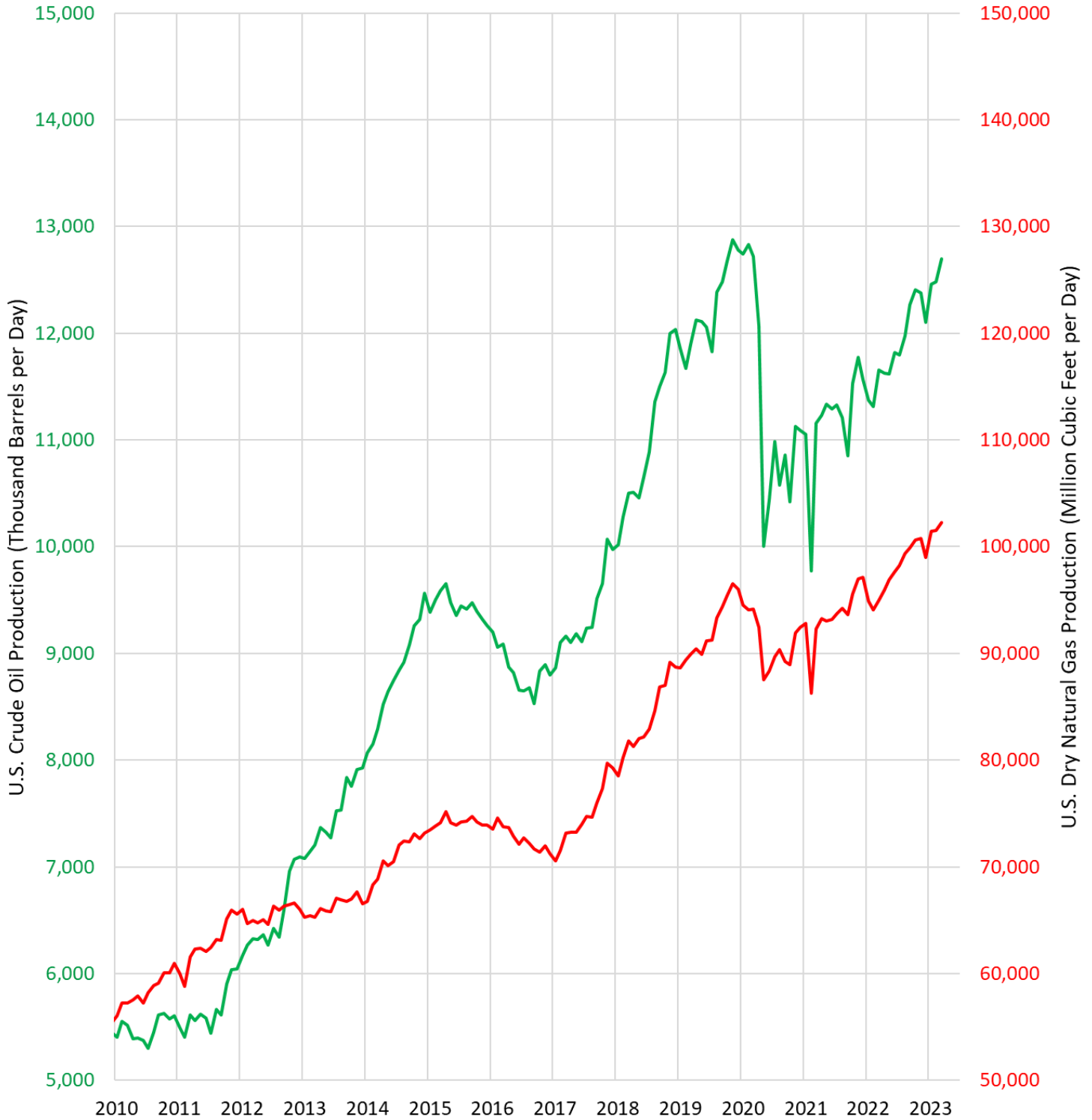
RIG ACTIVITY BY US REGION



*Source—Baker Hughes Weekly Rig Counts



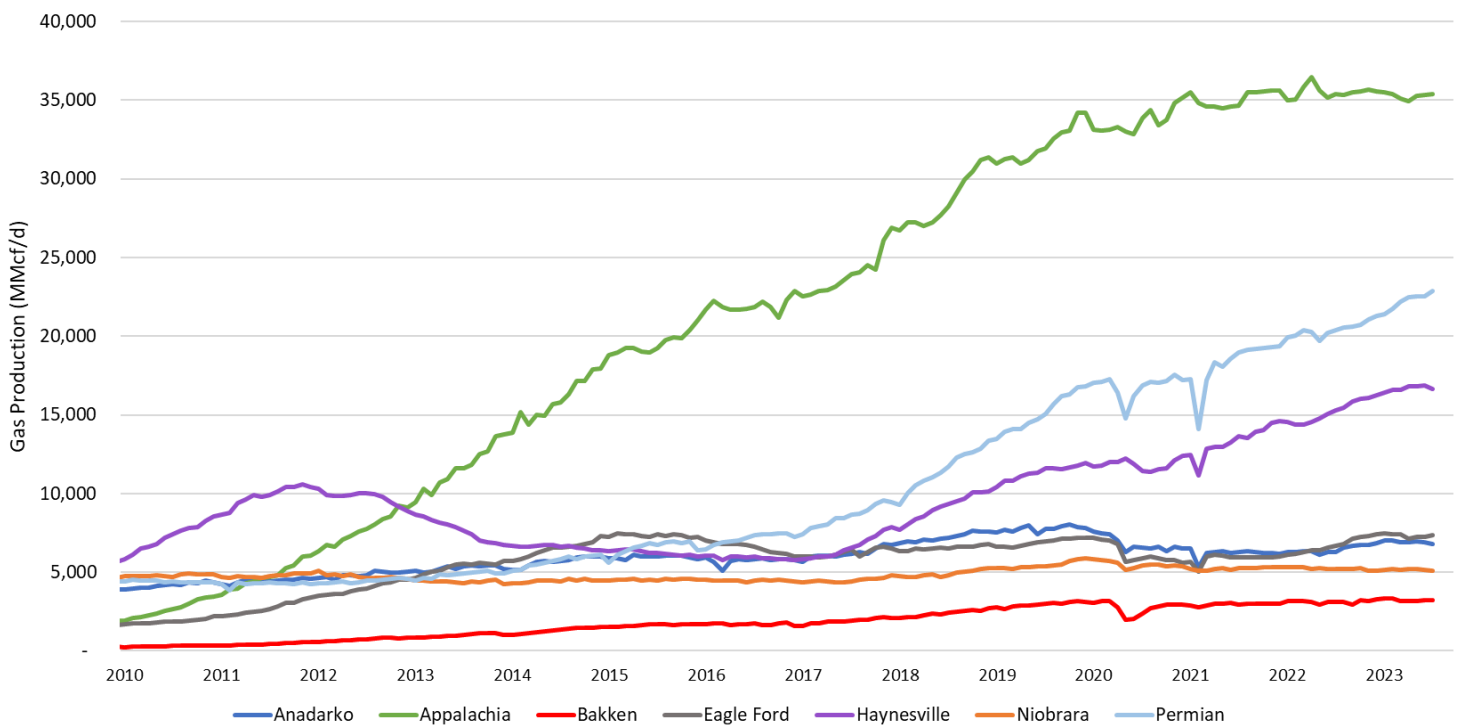
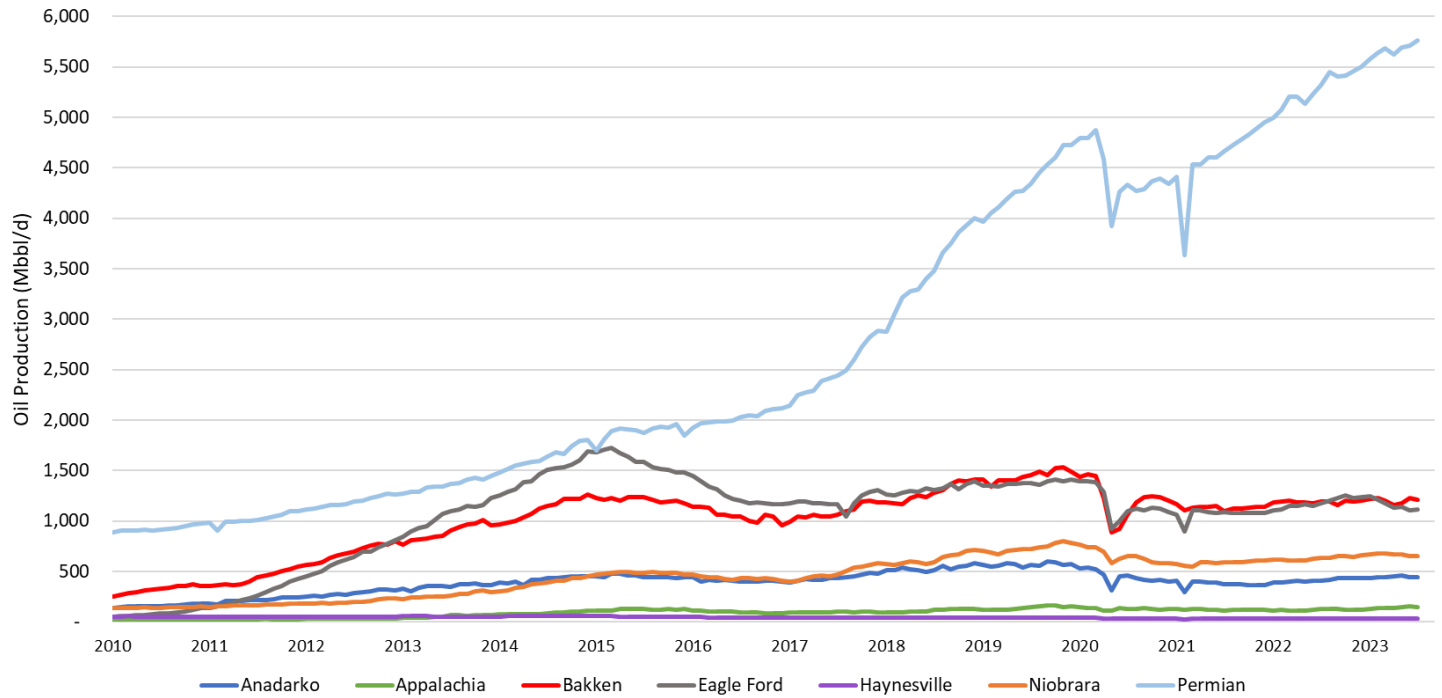
US DAILY CRUDE (MMbbl) & DRY NATURAL GAS PRODUCTION (MMcf)



*Source—Energy Information Administration, United States (EIA)



HISTORICAL PRODUCTION OF SELECTED US SHALE REGIONS



*Source—Energy Information Administration, United States (EIA)



UPCOMING EVENTS

July 2023

[Banff Energy Summit](#)

July 12-14

Banff, Alberta, Canada

August 2023

[Salesforce For Energy \(with Opportune\)](#)

August 2

Oklahoma City, OK

[Enercom Denver](#)

August 14-16

Denver, CO

[Women In Minerals – Dine n Deal](#)

August 16

Denver, CO

[TXCPA Energy Conference](#)

August 25

Houston, TX

[Society of Petroleum Engineers \(SPE\) - Saint Arnold's Season Kick-Off Social](#)

August 30

Houston, TX

September 2023

[Enertia User Conference](#)

September 21-22

Fort Lauderdale, FL

[HPF 29th Annual Golf Tournament](#)

September 25

Cypress, TX

[World Oilman's Overnight Poker Tournament \(WOOP\)](#)

September 28-29

Lake Charles, LA

*Denotes an Opportune Sponsored Event



ABOUT RALPH E. DAVIS ASSOCIATES

Ralph E. Davis Associates LLC (RED) is an industry-leading petroleum engineering and geosciences firm committed to satisfying the individual needs of clients. We accomplish this by holding ourselves to the highest standards of integrity and professionalism to deliver honest, direct and actionable insights to help clients achieve their strategic objectives. We distinguish ourselves by combining reservoir engineering, geoscience evaluation techniques and advanced data analytics with economic analyses to provide our clients with individual, customized solutions.

Banks, bondholders, private equity firms, financial institutions and law firms around the world trust in RED's diverse services and unrivaled upstream oil and gas expertise to deliver comprehensive solutions that help clients make informed decisions. We add value to every engagement by employing a team approach, leveraging Opportune LLP's experienced bench of experts in transactional due diligence, tax advisory, investment banking, restructuring and valuation.

We offer technical and economic analyses to deliver our clients a complete, independent, accurate and detailed assessment of the value of their assets. We apply a robust set of technical capabilities to assist our clients. Our capabilities include:

- Reservoir engineering and geosciences
- Economic forecasting and reporting
- Data analytics and geospatial analysis

KEY CONTACTS



Steve Hendrickson is the President of Ralph E. Davis Associates, an Opportune LLP company. Steve has over 35 years of professional leadership experience in the energy industry with a proven track record of adding value through acquisitions, development and operations. Steve is a licensed professional engineer in the state of Texas, and holds an M.S. in Finance from the University of Houston and a B.S. in Chemical Engineering from The University of Texas at Austin. He recently served as a board member of the Society of Petroleum Evaluation Engineers (SPEE) and is a registered FINRA representative.



John Beaird is Vice President of Ralph E. Davis Associates, an Opportune LLP company. John has 39 years of oil and gas management, reservoir engineering, and petroleum economics evaluation experience. Recent relevant experience includes the Permian, Western Gulf, Tx-La-Miss Salt, Mid-Continent, Denver-Julesburg, Wind River, Williston Basin, and Appalachian Basins. John is a registered Petroleum Engineer in the State of Texas and holds a B.S. in Petroleum Engineering from Louisiana Tech University. He is also an active member of the Society of Petroleum Evaluation Engineers (SPEE).



Yvonne Trujillo is a Senior Petroleum Engineer at Ralph E. Davis Associates, an Opportune LLP company. Yvonne has over 25 years experience in the oil and gas industry with extensive expertise in reserves engineering, SEC and PRMS/SPE reporting and economics and asset evaluation in conventional and unconventional reservoirs in the U.S. Lower 48. Yvonne earned a B.S. in Mechanical Engineering at Simon Bolivar University in Caracas, Venezuela and an M.S. in Petroleum Engineering at the University of Houston.



David Edwards is a Petroleum Engineer at Ralph E. Davis Associates, an Opportune LLP company. David has over three years of reserves engineering experience in conventional and unconventional reservoirs. Before RED, David was a Petroleum Engineer at a lower middle market A&D advisory firm where he handled the technical processes for marketed assets. He began his career with an operator in Dallas, where he contributed to its engineering, operations, and A&D teams. David holds an M.B.A. from The University of Texas Permian Basin and a B.S. in Petroleum Engineering from The University of Oklahoma.

