Update: Mark Papa joins Riverstone as Partner

Dear Limited Partner,

We are delighted to inform you that Mark G. Papa has joined Riverstone Holdings LLC as a Partner and member of the Investment Committee. Mark is widely credited with pioneering the North American shale oil revolution during his 15-year tenure as Founder and CEO of EOG Resources. He is one of the energy industry's great innovators and is renowned as one of its most efficient operators. For more about Mark, please see the attached *Wall Street Journal* article from December entitled "The Oilman to Thank at Your Next Fill Up." It is a privilege to welcome him to the Riverstone team.

Mark will be based in our Houston office. While assisting with the strategic development of certain of our existing investments, he will be pursuing a new investment initiative for Riverstone to build an integrated North American E&P/midstream company. It is his desire and our intent to have Mark ultimately transition to leading that company as CEO.

Mark has been one of the most influential figures in the shale revolution that has transformed the global energy industry. As CEO of EOG from 1998 to late 2013, he was among the first to prove the viability of unconventional oil production, which has helped drive U.S. daily oil production from 5 million to 9 million barrels. Under his leadership, EOG's market capitalization increased from $2 billion to $60 billion. The company grew to become the largest crude-oil producer in the continental U. S. while operating under one of the industry's most efficient cost structures. Mark holds an M.B.A. from the University of Houston and a petroleum engineering degree from the University of Pittsburgh.

Commenting on his new appointment, Mark said, "I am excited to be joining Riverstone and its talented team of energy investment professionals. This is a uniquely interesting and challenging time in our industry. As I surveyed the energy landscape following my recent retirement from EOG, I could not imagine a better opportunity than joining Riverstone, which I regard as one of the premier energy investment platforms in the world. I have known David and Pierre for over 25 years, and I look forward to helping the firm build upon its investment track record."

Riverstone founders David M. Leuschen and Pierre F. Lapeyre, Jr. said, "We are excited to have Mark join Riverstone. Mark will bring tremendous operating experience and insight to our portfolio, both as a Riverstone Partner and, likely, as a CEO himself. During this time of unprecedented opportunity, his hiring underscores Riverstone's continued commitment to attracting the very best talent in the industry, including proven operators with a successful track record of creatively reshaping the business."

We look forward to Mark's contributions to the firm in the years to come. Please join us in welcoming him to Riverstone.

Best regards,
Elizabeth

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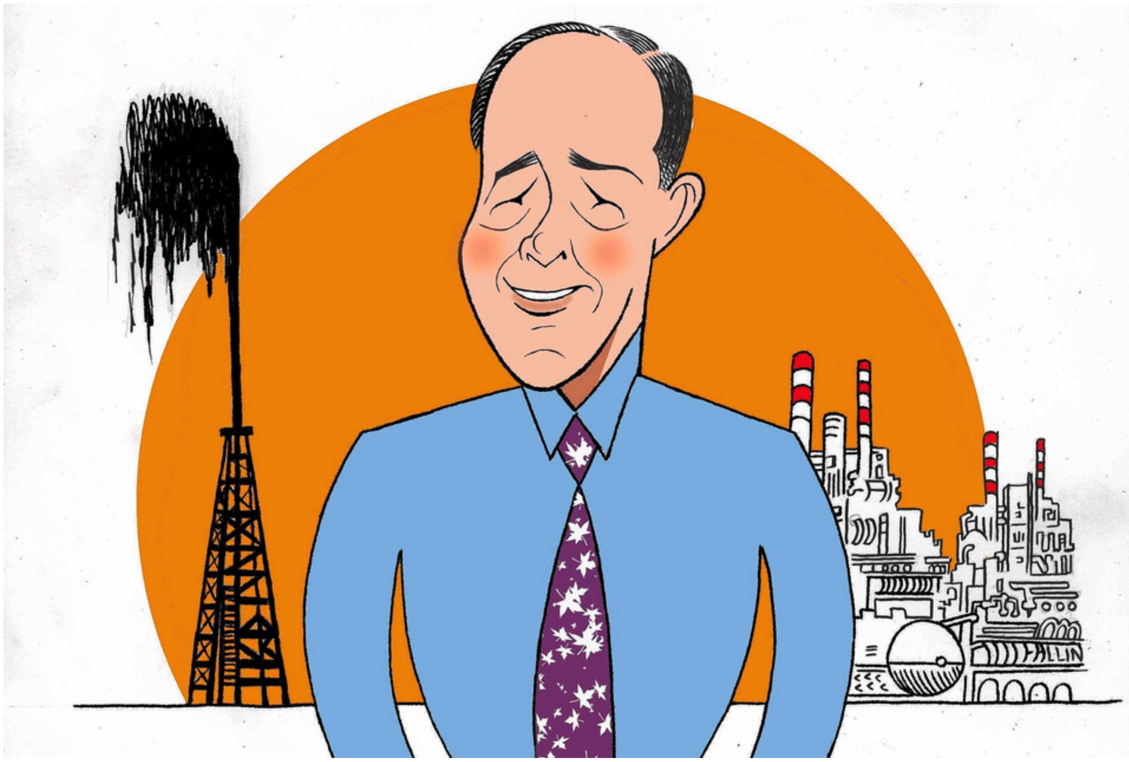
THE WEEKEND INTERVIEW

The Oilman to Thank at Your Next Fill-Up

The ‘accidental CEO’ Mark Papa says even he underestimated the shale revolution, which will continue despite lower prices.



By
JOSEPH RAGO
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On Wednesday, an OnCue Express in Oklahoma City became the first U.S. filling station since 2010 to sell regular gasoline for under $2 a gallon. The national average—hovering around $2.74 this week, also the lowest since 2010—is down 51 cents in a year and continues to fall, which Goldman Sachs pegs as equivalent to a $75 billion tax cut over the past six months. Consumers can thank Mark Papa, the oilman whose role in creating this income windfall remains, for the most part, unsung. The same goes for the many other benefits of the modern American energy boom.

Mr. Papa retired last July as CEO of EOG Resources, the drilling company that he made into the largest crude-oil producer in the lower 48 over his decade and a half as chief. “They were among the pioneers of the unconventional oil and gas revolution,” says the peerless energy historian Daniel Yergin —a company that advanced new frontiers in hydraulic fracturing and horizontal drilling, allowing producers to tap dense, hard-to-extract shale.

“I can’t think of any other single event that has caused such a positive economic benefit to the nation as a whole as shale oil and shale gas,” Mr. Papa says on a visit to New York this week from his home near Houston. “The fact that oil prices have collapsed as much as they have is directly attributable to the shale revolution.”

As Mr. Papa reads the global market, the price slump is the result of “a bit more production” that has made all the difference—an additional million or so barrels of new oil daily amid world-wide demand of about 92 million barrels a day. Some of that is “unanticipated supply coming out of places such as Libya,” he says, but the major driver is U.S. shale oil.

In 2012, Mr. Papa explains, the year-over-year growth of domestic shale oil was about a million barrels daily, and last year growth slowed to 800,000. “The general feeling was that we’ve had flush production and the easy stuff had been had, and as you got into the third year, it was becoming a little more difficult to achieve this tremendous boost in production.” About 700,000 barrels for 2014 was the consensus.

Instead, “to the surprise of most people,” Mr. Papa says, including himself, daily U.S. production growth this year surged to 1.2 million barrels on average. Now “the expectation is or was at $100 oil that the U.S. would continue to grow at a million barrels per day per year, per year, per year. People forecast, my gosh, we have more oil on the market than we thought, and next year we’re going to have an even bigger surplus of supply over demand, and the following year even more, and so perception became reality and all of sudden—boom.”

The U.S. crude-oil benchmark of West Texas Intermediate has tumbled by about $30 per barrel since June, after hanging out at $100 for three years. EOG’s crude production climbed by 40% in 2013.

Given that the company was “one of the first movers in shale-oil activity in the U.S., frankly I thought we had our finger on the pulse of what was going on in the industry,” Mr. Papa says. What happened is that “a step-change efficiency improvement” sneaked up this year as technology advanced and drillers found ways to make wells more productive and extract more oil from the same play.

The drop in oil prices doesn’t mean the U.S. is heading into a boom-and-bust crash, Mr. Papa believes, but momentum will “decelerate considerably” after about six months. “U.S. oil production growth is going to slow in 2015, 2016, 2017 simply because E&P companies”—the industry term for Exploration & Production—“are not going to have the cash flow to reinvest.”

The major U.S. shale fields—the Bakken regional formation in North Dakota, the Eagle Ford in south Texas, the Permian basin in west Texas and southeast New Mexico—"still yield positive economic returns" with oil at $70 or even in the mid-$60s, Mr. Papa says. "Fringe areas" like the mid-continent Mississippian or the DJ basin in the Rocky Mountains will become less attractive. And some highly leveraged drillers may be shaken out if prices remain low, while for others introducing more discipline and incentives for innovation.

If this is "somewhat of a self-correcting event," Mr. Papa says, what a "fantastic turnaround" from only a few years ago. "Pretty much everybody, both inside and outside the industry, was predicting that production was on an inevitable continued decline and there'd be an ever-increasing dependence on imported oil year after year after year." Without shale oil, he guesses, the oil price would be $100 to $120 today, adding that "I think you can certainly say that by 2020 we have a good chance to be North American energy independent, such that U.S. production plus Canadian imports will fulfill all our oil requirements."

A petroleum engineer by training, Mr. Papa became "the accidental CEO" when Enron "decided to jettison tangible assets as they evolved into a trading company" and discarded its EOG division in 1999. Around that time, a billionaire wildcatter named George Mitchell proved in the Barnett Shale near Fort Worth that vertical fracking was a viable technology, and EOG refined horizontal drilling techniques for natural gas—directing the bit sideways through the layers of shale—and soon became an industry leader. The supermajors like Exxon and Chevron were taken by surprise.

"About 2007," Mr. Papa recalls, "I looked around and said, EOG has found so much shale gas, but there are a whole lot of other companies that have found vast amounts of shale gas. All the other companies were ecstatic, and their whole business strategy was, 'We're going to find more shale gas.' I stood back and said this probably doesn't bode well for natural-gas prices in North America."

If gas prices would remain depressed due to a glut, as in fact they would, Mr. Papa's insight was that perhaps oil, as well as gas, could also be coaxed from shales. Oil molecules are several times as large as gas molecules, and "because the flow paths through these shales are very small, very narrow and restrictive, the general feeling was that you could not produce oil from shales commercially."

Mr. Papa and his team suspected this was "an apocryphal old wives' tale," and no one had "really done the work to prove that conclusively. So we challenged that dogma, and it was incorrect."

EOG maintains no central research-and-development department. "Our R&D was just applied R&D," Mr. Papa notes. "We went out there, drilled some wells, and the first eight or nine were unsuccessful. We got improvements, improvements, improvements, until we finally ended up hitting the right recipe for success."

EOG's decentralized technical operations and "minimum bureaucracy" encouraged engineers to experiment well by well.

Late in 2006, EOG showed that shale oil was feasible in the Bakken. This discovery meant that EOG could switch to oil, with production flipping to 89% liquids (mostly crude) this year from 79% gas in 2007. More to the point, by proving everyone else wrong—again—Mr. Papa changed the domestic industry as other companies chased his achievement. To the extent that U.S. shale oil is transforming world-wide markets, he deserves a lot of the credit.

Early on, Mr. Papa had "made some armchair estimates about what the effect would be on total U.S. production. I undershot by factors of two or three times what has actually happened. I never grasped the scale of it. I underestimated what might happen if we were successful."

In retrospect, Mr. Papa misjudged the upward slope of technological progress. "A lot of people look at the oil business and they see a picture of a roughneck working some pipe on an oil derrick and there's dirt and grease and everything else, and they think this is so retro of an industry. That's such a misnomer," he says.

"Where we sit today with shale is the same place a petroleum engineer sat in the 1940s with a conventional sandstone reservoir," Mr. Papa says. The best recovery rate then was 10% to 15%, leaving the rest underground, much like shale now—but since has climbed to 40% or 50%. The technology doesn't yet exist for shale to yield similar shares, but Mr. Papa is confident that over the next 10 years it will emerge, "which basically means we're going to double or more the amount of oil we're going to recover. . . . Technology is always going to find a way to unlock each increment of resources."

Mr. Papa discounts what could be considerable political risks to the energy boom, like some carbon tax or a federal takeover of fracking oversight. On the latter, he thinks the business is well regulated by the states and "there's been a million frack jobs performed in the U.S. with zero documented cases of damage to the drinking-water table. For my set of statistics, those are pretty good odds."

As for everything else that might come out of Washington, Mr. Papa says: "It's my belief that for likely the next 40 or 50 years, we'll continue to be in a hydrocarbon-powered economy, the main drivers of which are natural gas and crude oil. . . . You have to rely on the logic of the American people and our legislators to say, look at the economic benefits. The benefits are so obvious that an objective person would question whether we want to impose punitive regulations that will diminish what's accrued."

Mr. Papa reels off a few examples: A new burst in employment, business investment and GDP. Self-sufficiency in natural gas “for probably the next 50 years” and a two- or threefold competitive price advantage over Europe and Asia, leading to a revival of in-sourced manufacturing. A state and federal tax-revenue bonanza. Diminishing the importance of Persian Gulf and Russian energy dispensations in foreign policy.

Mr. Papa observes that these disruptive gains confounded the zodiac readings of the experts. The gains were driven by smaller, independent, nimbler companies, risking their own capital on potential breakthroughs across mainly state and private lands without federal subsidies.

“If you want to point to a success of private enterprise, and how the capitalist system works for the benefit of the total U.S. economy,” he says, “I can’t come up with a more glowing example.”

Mr. Rago is a member of the Journal editorial board.