

SHALE



MARCH/APRIL 2020

MAGAZINE

**ANOTHER OIL
BOOM REACHES
A SUDDEN END**

**NEPA
REFORMS
AND THEIR
IMPACT ON
SHALE**

**BLOCKCHAIN
IN ENERGY**

**LIFESTYLE:
POWER IN
MANUFACTURING**

**THE ETHANOL
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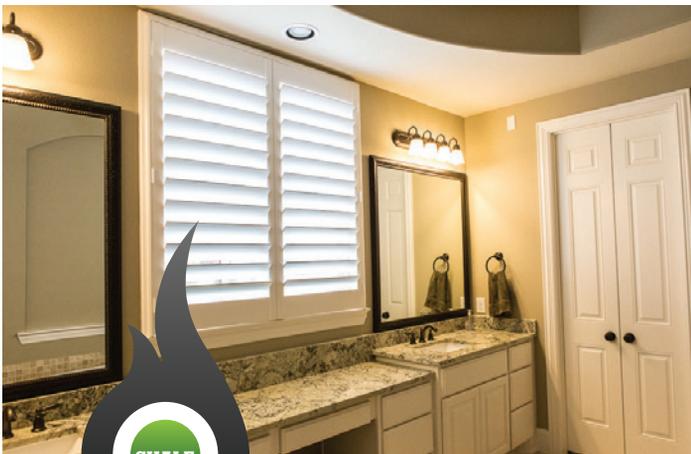
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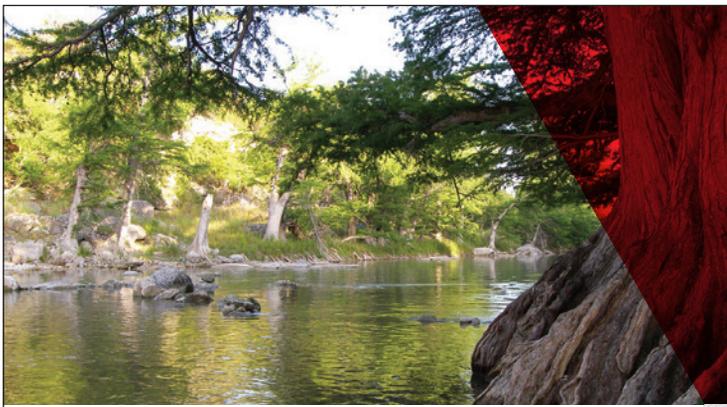
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WELCOME TO YET ANOTHER GREAT ISSUE OF SHALE MAGAZINE.

We are happy to have Tracee Bentley, President and CEO of the Permian Strategic Partnership, gracing our cover on the March/April edition of SHALE Magazine.

As we all know, the Permian Basin is buzzing with energy activity. While the world focuses on current events that have widespread effects, such as trade discussions and coronavirus, West Texas continues to produce and transport natural resources to meet domestic and international demand. In addition to the continued growth of energy production in the Permian Basin, the area is seeing a wave of infrastructure growth as well to accommodate the influx of residents and visitors.

Part of that infrastructure growth is a result of a newly-formed organization, the Permian Strategic Partnership (PSP). This organization is doing wonderful things to lessen the impacts of huge population growth and modernization of the area to make it more accommodating to current residents and appealing to those considering making the Permian their home with the support of the oil and natural gas industry. Learn more about this organization and its steadfast leader, Tracee Bentley, in the cover story of this issue.

As 2020 is now well underway, SHALE and Texas Energy Advocates Coalition (TEAC) have a full year of plans to make networking with us and other energy professionals and advocates even easier. I encourage you all to join TEAC by visiting txenergyadvocates.org and sign up for SHALE's newsletter on shalemag.com to stay apprised of upcoming events and networking opportunities.

Our signature event will be our annual State of Energy luncheon, being held in Corpus Christi at the Omni Hotel on Sept. 22. This event will feature a welcome message from Representative Cloud as well as our featured speakers, Sean Strawbridge, CEO, Port Corpus Christi, and Mike Howard, CEO, Howard Energy Partners.

Please enjoy this next issue of SHALE and join us at the State of Energy luncheon. There is so much information to be shared currently as we move forward into 2020 and beyond. We hope to continue to be your source for energy news and expert opinion with all our efforts.

KYM BOLADO

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April 17, 2020
Katy, TX

OHH Rockies Clays Shoot

May 15, 2020
Brighton, CO

OHH Rockies Fishing Tournament

May 30, 2020
Watford City, ND

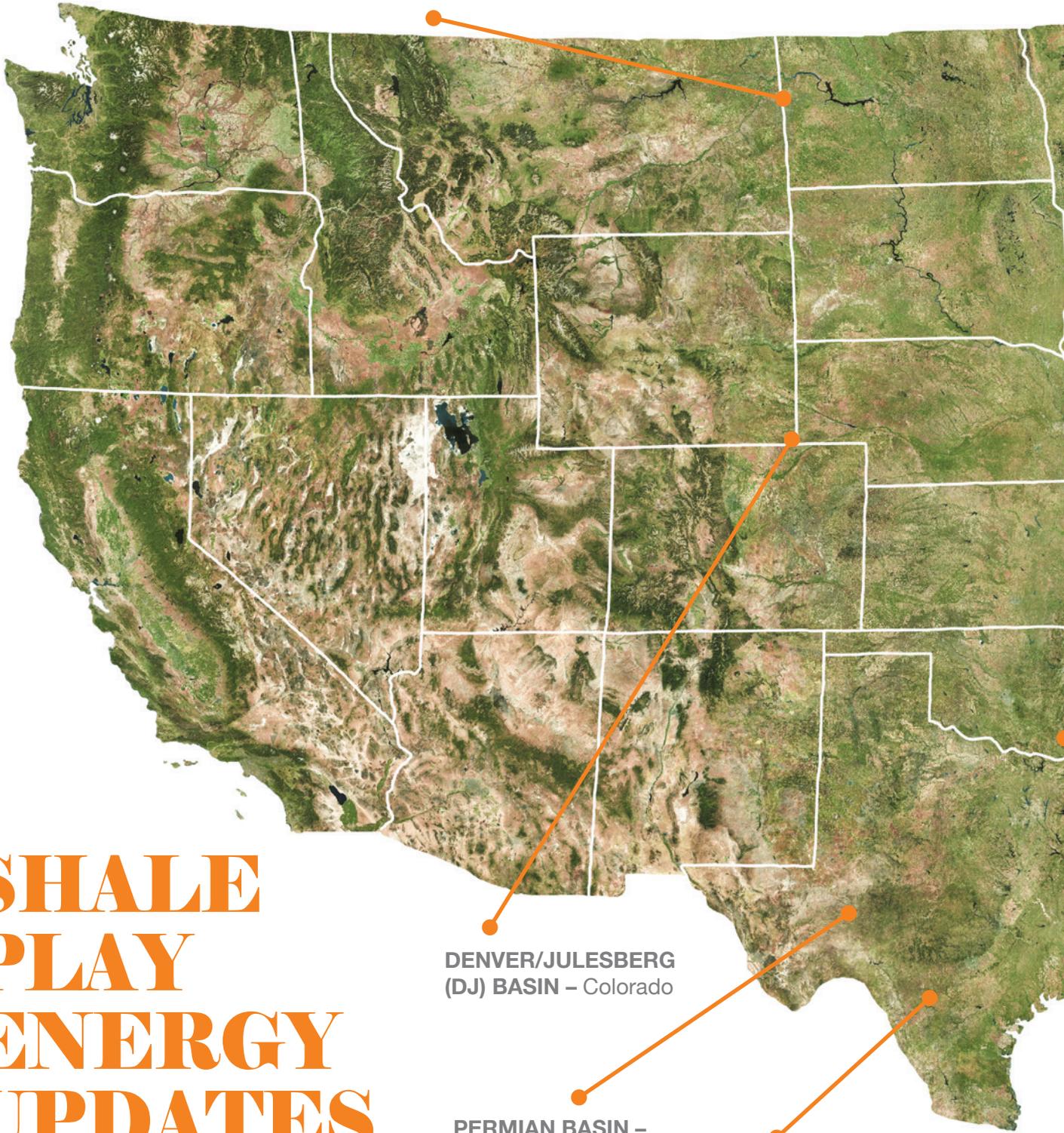
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BAKKEN SHALE – North Dakota/Montana



SHALE PLAY ENERGY UPDATES

By: David Blackmon

**DENVER/JULESBERG
(DJ) BASIN – Colorado**

**PERMIAN BASIN –
Texas/New Mexico**

**EAGLE FORD
SHALE – Texas**



MARCELLUS/UTICA SHALE –
Pennsylvania/West Virginia/Ohio

HAYNESVILLE/BOSSIER PLAY –
Louisiana/East Texas

SCOOP/STACK PLAY –
Oklahoma



Note: Recent events surrounding the global coronavirus pandemic and the collapse of the OPEC+ export limitation agreement have disrupted the normal course of business in the U.S. shale industry. At the time of this issue's publication, shale producers were universally focused on restructuring their capital budgets and making plans for continuing their business endeavors in a lower-price environment. As a result, information on rig counts, production levels and significant events in each play area that would have otherwise been relevant to report are now in flux and likely to change dramatically in the weeks to come. We will return to our normal format for Shale Play Update in our next issue of SHALE Magazine.



About the author: David Blackmon is the Editor of SHALE Oil & Gas Business Magazine. He previously spent 37 years in the oil and natural gas industry in a variety of roles — the last 22 years engaging in public policy issues at the state and national levels. Contact David Blackmon at editor@shalemag.com.

Another Oil Boom Reaches a Sudden End

By: David Blackmon

Concerns over the spread of the coronavirus and its dampening effects on global crude demand combined with the irrational actions of Saudi Arabia and Russia in early March caused crude prices to crater. With analysts like Goldman Sachs, along with the U.S. Energy Information Agency (EIA) and the U.N.'s International Energy Agency (IEA) now predicting that overall demand for crude oil will actually contract during 2020, the lower price situation is likely to linger at least into 2021.

This in all likelihood means that the shale oil boom that began in mid-2016, creating the largest-ever increase in American oil production and turning the United States into the world's largest producer, is over—at least for now. The big question becomes: What happens next?

I'm old enough to have seen this all before. In fact, during the course of my 40-plus years in and around the oil business, I've seen booms and busts come and go so many times that I've lost count. A very good friend in the business was fond of saying that the only thing you can count on in the oil business was that the industry would always, without fail, drill itself out of prosperity, and that is exactly what has happened here when you get right down to it.

For more than two years now, it has been obvious that the rapid growth of U.S. oil production could only be sustained by the continuation of the OPEC+ agreement by the world's other



large oil-producing countries to limit exports. The more oil barrels that U.S. producers poured onto the market, the deeper the OPEC+ countries would have to cut in order to sustain a price high enough to make ongoing shale drilling profitable.

But U.S. upstream companies, urged on by pressure by inves-

tors and market conditions, just continued to drill more and more wells, relying on often-irrational actors like Russia and Saudi Arabia to continue acting rationally, cutting ever-deeper into their own production volumes in order to support the price.

This is the behavior my friend was talking about, of course.

Crude prices had already dropped below healthy levels even before Russian and Saudi Arabian leaders took their irrational actions around the OPEC+ meeting in early March. Concerns over containing the coronavirus had by then caused the Chinese economy to basically flatline, leading IHS Markit to project that

oil demand during the first quarter of 2020 would be more than 5 million barrels per day less than during Q1 2019. Enough impacts had already been felt that, by the time Russia told the OPEC+ meeting that it would not support another proposed 1.5 million barrels of oil per day cut in exports, the price for a barrel of West Texas Intermediate had already dropped to \$46, well below the break-even price for many shale wells.

Russia's announcement came on Friday, March 6, and WTI dropped to \$41 per barrel. When the Saudis announced their plan to dramatically increase their own production in retaliation to Russia's actions the next day, the price collapsed to \$31 on Monday, March 9. As I write this piece a few days later, no one knows whether the Saudis and Russians will play at this game for a long period of time. It is known at this time, though, that the price impacts from the demand-destroying effects of the coronavirus will very likely linger throughout the remainder of 2020, making a return to a WTI price above \$50 per barrel a dim prospect.

There is much speculation at the time of this writing that Moscow and Saudi Arabia believe they can "kill" America's shale industry by collapsing oil prices.

But we know that the Saudis have already tried to kill the U.S. shale business once before when they intentionally flooded the market with crude and caused prices to drop into the low \$20s. Their belief then was that they could cause hundreds of U.S. producers to go out of business, taking millions of barrels of U.S. production per day off the market entirely.

That, of course, betrays a complete misunderstanding of how the free U.S. market works, and of the nature of American bankruptcy laws. While the crash in oil prices that began in late 2014 did ultimately result in hundreds of shale producers declaring Chapter 11 bankruptcy, the net result of that process is that most of those companies reorganized themselves and came back with far less debt load. The strategy also fails to recognize that most producers have already put hedges in place for most of their equity production through the remainder of 2020 and beyond.

As a result of these realities, from the time the Saudis embarked on their strategy to reclaim market share in mid-2014 through August 2017, when they initiated talks with Russia related to the OPEC+ agreement, overall U.S. production actually rose by half a million barrels per day. That increase in production came during a period of time in which more than 200 upstream companies went through the bankruptcy process.

So, if Moscow's and Riyadh's plan here really is to try to "kill" the U.S. shale industry, they had better be prepared – and able – to sustain it for a long and painful haul. For Russia, whose economy is highly dependent on oil income, many analysts question whether that country could sustain the impacts of \$30 oil for even a year. Saudi Arabia is in a much better financial condition, but the royal family there burned through about 40% of its sovereign wealth fund the last time they tried this, in their efforts to sustain their country's array of social programs.

By the time this is published, it is possible that the actions by the Saudis and Russians will have been resolved

and the OPEC+ agreement renewed. But the price impacts from the coronavirus will linger throughout the remainder of 2020.

One thing we know for sure is that all the major players in every country involved in this situation have been through all of this before and, if they remain involved in this cyclical industry for another 5-7 years, they will most likely go through it all again.

Because the only truly predictable thing about the oil and gas business is that the industry will ultimately drill itself out of prosperity, and that's essentially what has happened yet again.

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COVER
STORY



TRACEE BENTLEY

PARTNERING IN
THE PERMIAN

By: David Blackmon
Photography by: Michael Giordano

THE PERMIAN BASIN IS A VERY BIG PLACE.

A vast expanse encompassing most of West Texas and the Southeastern quadrant of New Mexico, the region is roughly the size of the entire state of Utah. Like Utah, most of the Permian is characterized by arid, sparsely populated desert country.

Over the last five years, the Permian region has without question been the hottest oil and gas play area on the face of the earth. More importantly, this region has served as the center of a shale oil boom that has led the transformation of the United States from heavy dependence on foreign oil to the largest oil-producing nation on earth. The light, sweet crude that flows up from formations with names like the Delaware, Glorieta, Wolfcamp, Spraberry and Bone Spring has also served as the feedstock that has made the U.S. now the world's fourth-largest oil exporting country.

Just 14 years ago, in Sept. 2006, the United States produced just 3.6 million barrels of oil per day. That much oil — and more — is now produced by Permian wells alone every day. In addition to the liquids production, most Permian wells also generate large volumes of associated natural gas, so much so that, despite the fact that none of the 400 or so active drilling rigs there are technically drilling “gas” wells, the Permian now ranks behind only the Marcellus/Utica shale region in terms of total natural gas production.

To say that the Permian has become a major generator of tax revenue and economic wealth is to be the master of understatement. Despite often-rocky economic conditions nationally, the Texas economy has experienced an almost-continuous state of above-average growth over the past decade thanks to the jobs-creation and economic development created by the state's oil and gas industry. A recent report issued by the industry trade association TIPRO found that the industry directly supported more than 360,000 jobs in Texas in 2019, an increase of more than 5,500 over 2018 despite chronically low commodity prices that continue to plague the business.

The same study found that “between 2010 – 2019, total state taxes and state royalty payments paid by the industry in Texas exceeded \$116 billion, including a record \$16.3 billion contributed in 2019.” Much of that state tax revenue comes in the form of the severance tax on oil and natural gas, which accounts for virtually all of the funding for the state's Rainy Day Fund.

This massive influx of funding from the oil and gas industry has helped to keep the state's budget in a state of near-uninterrupted surplus over the last decade, enabling policymakers to take on the funding of massive infrastructure projects that had languished for years. The best example is the state's 50-year Water Plan, which was approved by the Legislature in the mid-1990s but never funded. Thanks to the booming industry in the Eagle Ford Shale and Permian, the 2013 session of the Legislature was able to tap the Rainy Day Fund to serve as the funding mechanism for the entire Plan.

The Legislature has also been able to use the Rainy Day Fund several times in recent sessions to beef up funding to Texas Department of Transportation (TxDOT) to help improve and maintain the road systems in counties with high oil and gas development to keep up with energy-related traffic issues. This has been vital due to state-mandated caps on ad valorem tax collections by counties, school districts and other local taxing entities.

It took a little longer for it to develop, but over the past two to three years, the state of New Mexico has begun to see similar economic and tax impacts from a rapidly grown oil and gas sector, as the industry has begun to develop the portion of the Permian that lies beneath Lea and Eddy counties in earnest.

In any state, the reality is that an oil and gas boom brings with it a discreet set of well-known local impacts. From the Barnett Shale boom in North

Texas 20 years ago to the Eagle Ford boom starting in 2009 to the Permian boom that began in earnest in 2011, the impacts have always been the same: oil and gas is an extractive industry that brings with it a great deal of heavy truck traffic, and an influx of new people to man the rigs, frac crews and office jobs that spring up in communities across the region.

The traffic and drilling and production equipment create issues related to congestion, dust, noise and viewsheds. The new people put stress on local schools and housing, as well as police and fire department needs. Then there is water: oil drilling and fracking create needs around sourcing, reusing, recycling and disposing of water once it has been used.

To its credit, the industry as a whole has become more responsive to these known community needs over time

and employed region-specific approaches to addressing them. When the issues began to reach a critical mass early on in the Eagle Ford boom, the industry took the initiative of creating the South Texas Energy and Economic Roundtable, or STEER. That organization was a regional association that served as a sounding board and coordinating clearinghouse for cooperative approaches to addressing pressing issues as they arose, and became a very effective voice for clear public communications.

As the boom times in the Eagle Ford have wound down, the industry has chosen to roll STEER into the organizational structure of the Texas Oil and Gas Association (TXOGA), where it still oversees Eagle Ford-related issues for the industry. While it is always hard for an industry that consists of hundreds of competing companies in the free-market system to advance unified responses to issues, the STEER model and staff were quite effective in allowing the various companies to speak and act in a unified fashion.

By mid-2018, a similar discreet set of impacts had bubbled up across the Permian region and risen to the point of intensity that led a group of 17 company leaders doing business there to create a regional partnership designed to help address those issues in a coordinated fashion. In November of that year, the establishment of the Permian Strategic Partnership (PSP) was formally announced, along with its impressive initial funding commitment of \$100 million. (That commitment has since been raised to \$180 million over five years.)

While in some ways similar in structure to STEER, the founders of the PSP quickly realized a different mission was required. STEER's main focus was on addressing operational issues in the Eagle Ford region due to the lack of any pre-existing regional association. But the Permian already had a regional trade association addressing such issues in the Permian Basin Petroleum Association (PBPA), a traditional trade association that has been doing such work for many decades.



THOUGH THE PSP'S BUDGET IS QUITE ROBUST, IT QUICKLY BECOMES OBVIOUS THAT THIS IS NOT AN OPERATION THAT IS FOCUSED ON JUST THROWING MONEY AT PROBLEMS — INSTEAD, IT SUPPORTS LONG-TERM SOLUTIONS THAT WILL SERVE TO MAKE LIFE BETTER FOR EVERYONE



Seeing that role already ably filled, PSP's founders landed on a different focus in its mission statement: "To strengthen and improve the quality of life for Permian Basin residents by partnering with local leaders to develop and implement strategic plans that foster superior schools, safer roads, quality healthcare, affordable housing and a trained workforce. The companies involved with the PSP will bring people, expertise, resources and leadership to develop solutions in partnership with local leaders and communities."

Note the emphasis in that statement on the words "partnering" and "partnership," because you will be seeing them often in the remainder of this piece. Note also the emphasis on "plans" and "solutions," because those will be recurring themes as well since they together form the central focus of the PSP's day-to-day efforts.



FINDING THE RIGHT LEADER

Mounting an effort such as this requires a leader, and not just any leader would do. An enterprise of this scope and scale required the matching of the project to a person with the experience and skillsets needed to be able to plan and oversee all of the various moving parts. Beginning shortly after the PSP was announced, its board, led by its Chairman, former Secretary of Commerce Don Evans, embarked on a search for a new president who would become the face of the organization.

While strong management skills were certainly a requirement, that was far from the only one. The PSP needed a person with excellent communication skills, someone who had years of experience deploying effective communications to a large variety of audiences. Strong interpersonal skills were also a must, as this person would be conducting personal meetings and forming relationships with key officials and citizens across the vast Permian landscape. Experience with the oil and gas business was, of course, important, but experience with public policy and community outreach was equally vital.

PSP needed to find someone who could relate effectively to public policymakers in the morning, make a lunch presentation to a local chamber of commerce, and handle afternoon media calls all in the same day. Someone who could set the agenda for and conduct a high-pressure board meeting the next morning, perform outreach to a teachers' group in the afternoon and have dinner with a county judge or governor that evening. And then be able to do it all over again the next week.

Evans and his board of directors needed someone who could handle all of this and more with grace and composure. As luck would have it, they soon found the person they were looking for, in Colorado.

Being born into a farming and ranching family in Chaffee County, a rural area west of Colorado Springs, helped to form Tracee Bentley's outlook on life. "My dad's side of the family were farmers and ranchers, so mom worked at the prison, and actually she, in the last couple years, she retired as a warden," Bentley told us when we interviewed her in February. "Mom was not the first, but one of the first female prison wardens in the state of Colorado. So, you can kind of see where some of my influence comes from," she added with a laugh.

"Obviously I'm very proud of her. And then, my dad was a farmer who took a lot of pride in his work. The family farm was a little bit south of Chaffee County near the Monte Vista — which is in Saguache County. That's called the Arkansas Valley, and that was my stomping grounds."

Growing up in a rural area has had an ongoing influence on Bentley's choices in life. After graduating from high school, she decided to attend Colorado State University, located in Fort Collins. "I definitely am not a city dweller," she said. "Because of how I was raised, I've always preferred rural settings over the city. After college, even Fort Collins – which one would argue is not a huge city – became too much for me, so I moved to Weld County."

As it happens, Weld County has become the center of gravity for Colorado's own oil boom, lying as it does in the middle of the Denver/Julesburg Basin – or DJ Basin – which became one of the nation's hottest play areas



"WE LOVE LIVING IN A COMMUNITY THAT APPRECIATES AND UNDERSTANDS THE ENERGY SECTOR, AND CERTAINLY, THAT IS MIDLAND, TEXAS."

beginning around 2010. Though much more compact geographically than either the Permian or the Eagle Ford, the DJ Basin has been the center of a busy search for oil and natural gas, as well as a center of a great deal of controversy for more than a decade now.

"Weld County produces over 80% of the oil in Colorado, and pretty close to that in natural gas," Bentley said, "so we were at the epicenter of energy production in the state, and I was right smack in the middle of it. There was a time not too long ago, before I left to come to Texas, where you could stand out on my deck and see three active rigs going at the same time. So, we definitely lived and breathed oil and gas where I was at."

That early exposure to oil and gas has proven useful to Bentley, since, due to the career choices she has made, she would end up becoming involved with the Colorado oil and gas business and all the issues surrounding it from multiple different perspectives.





BEING IN THE RIGHT PLACE AT THE RIGHT TIME

At Colorado State, Bentley chose to study communications and wound up obtaining both a bachelor's and a master's degree in the field. Like many students, her extracurricular activities and interests while in high school led to her choice of majors.

"I loved debate in high school," Bentley said. "Schools from across the state held competitions on constitutional knowledge. We would be assigned a topic, and you had to either argue for or against it, and your only source of information was the Constitution. I absolutely ate that up.

"Number one, I love the history of our government and understanding why the law works the way it does, and how it can be interpreted. But, second of all, I really believe that one of the most powerful tools that we all have is our voice, and how we use that becomes so important when we are articulating an important message. So, I picked up on this very quickly.

"And I carried that love into college. I loved studying the theory of rhetoric — and now I'm getting a little bit nerdy, but Aristotle and Socrates, I just found it fascinating to read their work and have them talk about why they chose the work that they did and the power of words." She paused before continuing. "So, I decided this is definitely the major for me."

As her college career progressed, Bentley's major combined with a life-long interest in sports to lead her into the area in sports led her into broadcasting. "I'm a

huge sports lover," she told us. "I played three sports in high school, and I'm just a sports fanatic. So, I did a lot of work, signed up for several classes in sports broadcasting, and it went very nicely with my major"

Those classes eventually led her to an internship with the CSU athletics department. "That was amazing," she recalled. "I got to work particularly with the CSU football team at the time, working with the news stations that would come in, including the major ones like ESPN, and I was able to see some real behind the scenes stuff related to the broadcast. I really enjoyed that aspect of it too."

When the time came for graduate school, it was clear to Bentley where her path should lead. "I knew by the time I was applying to get my master's that I still wanted to go down this oratory/rhetoric path," she said, "so I decided to go ahead and pursue my masters in this area. I have always been one of those different students — I don't know, at the time it certainly was, maybe not nowadays — but I was always very motivated by public policy, and I wanted to get to know that process better. I wanted to know 'who are these people who are speaking for me and for my family and our community?' So, I volunteered on a few campaigns in high school, marched in parades, handed out signs for the representatives in my area.



All of that political activity in high school and college led Bentley to the nation's capital. "I went to Washington D.C. for a couple of years and worked for then-U.S. Senator Ben Nighthorse Campbell from Colorado."

Bentley came into that position with Senator Campbell in an unusual way. As she explains it:

"It was in 1995 when Bill Clinton was President. The Senate was deadlocked on a budget, and the President really, really needed the Senate to approve this budget. Senator Campbell was on the budget committee at the time, and he was going to be one of the key votes. But he just could not agree with the budget that was put in front of him, and he was feeling a lot of pressure. He was so unhappy with the budget and the discussions around it that he literally up and switched parties! So, he went from a Democrat to a Republican literally overnight, and his entire staff left because they had signed up to work for a Democrat.

"And so, the Senator picked up the phone and called the Congressman that I was interning for and said 'Well, my whole staff just left, do you have anybody you can loan me?' And the Congressman said 'Well, I have a new intern. I mean she's pretty green, but I'll send her over.'" She laughs at the memory. "So, they gave me a little box with all my things and said you're going to work for the Senator. I literally was at the exact right place at the exact right time, because nobody else my age with very little experience could've walked into the position that I was in at a U.S. Senate office. I mean, he had no staff, and so the couple of people who were there became the jack of all trades and we worked on everything. I got to experience a lot of things that nobody else would've gotten to, and I am forever grateful for that."

After her very eventful two years in Washington D.C., Bentley moved back to Colorado to finish her graduate work at CSU. Looking back, she credits her experience with Senator Campbell as forming the basis for the rest of her career. "I spent two years in Washington, and when I came back I knew that government and public policy and understanding both of them was something I enjoyed and felt I could make a difference in.. That helped drive my graduate work, and then really everything else beyond."



A STRONG REPUTATION CREATES NEW OPPORTUNITIES

Bentley's first job out of graduate school was as Director of National Affairs for the Colorado Farm Bureau. Given her background growing up in a farming and ranching family, the job was a natural fit. "I loved agriculture, so it made a lot of sense for me," she told us. "I was there for several years, absolutely loved it. Then, I started doing my own consulting work, and eventually started my own consulting firm."

Not surprisingly given her background, the client portfolio for Bentley's firm was tilted heavily towards agriculture and energy. "I didn't go out and recruit only AG and energy clients, but my clientele was heavy on both. I had a couple of renewable energy clients, along with oil and gas.

"People used to ask me how I was able to keep some of my clients from constantly being on the opposite sides of each other. My answer was communication and sometimes compromise. I gained a reputation for being this all of the above kind of consultant and it has served me well over the years."

When Denver businessman John Hickenlooper was elected to succeed Bill Ritter as Colorado Governor in 2011, he needed someone to re-organize and find funding for his energy office. Bentley's name quickly surfaced as a prime candidate for the post. "When Governor Hickenlooper got elected, he



DESPITE OFTEN-ROCKY ECONOMIC CONDITIONS NATIONALLY, THE TEXAS ECONOMY HAS EXPERIENCED AN ALMOST-CONTINUOUS STATE OF ABOVE-AVERAGE GROWTH OVER THE PAST DECADE THANKS TO THE JOBS-CREATION AND ECONOMIC DEVELOPMENT CREATED BY THE STATE'S OIL AND GAS INDUSTRY



needed to reappropriate funding for the energy office because somewhere in the transition between governors the office had lost its funding. It had no money to operate,” Bentley told us.

“Governor Hickenlooper wanted a more balanced energy office, which was very representative of Colorado’s energy portfolio,” she went on. Governor Ritter heavily favored renewable energy and his energy office had focused almost exclusively on promoting renewable energy sources. But Hickenlooper had more of an appreciation for the state’s growing oil and gas industry and wanted his administration’s policies to reflect that balanced approach.

“My plan was to refund and reorganize the energy office, then go back to my private consulting business, because I loved what I was doing, and I loved my clients.”

It was a good plan, but as with so many plans, the actual flow of events interceded to place Bentley on a different path. Once she had completed the job of getting the energy office refunded and set onto a more balanced course, the Governor came to her with another request.

“The Governor needed a legislative director who understood rural Colorado and most of the inner team were urban-centric. He realized he needed somebody who could provide that rural voice and perspective on all issues. So, he asked me if I would join the team and become his Legislative Director and Senior Advisor on agriculture and energy. That was just too good to pass up, so I said yes, and it was amazing. I’m really proud of some of the things I accomplished there. I feel that had my voice not been there to represent rural Colorado on some things, I’m not sure that they would’ve gotten their fair share, or certainly things would’ve turned out differently. So, I was thrilled to be there, and I wouldn’t take it back for the world. I am so thankful to Governor Hickenlooper for giving me that opportunity.”



MOVING INTO THE INDUSTRY

Right after Governor Hickenlooper was reelected in 2015, the American Petroleum Institute (API) decided to open an office in Colorado, where anti-oil and gas activists were heavily-organized and leading a raft of efforts to hamper the industry through local ballot initiatives. API’s goal was to establish an office that would work to provide accurate information to Colorado citizens through earned media and other messaging efforts.

“Opening the API office in Colorado was just too good to turn down,” Bentley told us. “So, I left Governor Hickenlooper and went to open the Colorado Petroleum Council (CPC). We became a premier trade association rather quickly in Colorado and one that everybody trusted. When ballot measures, rulemakings, resolutions, etc. were all coming at us at the same time, and there were many of them, we were going to be the one to do a top-notch, well organized and led effort.

A perfect example of this was Proposition 112, a statewide measure that activists successfully placed on the Nov. 2018 ballot. Prop 112 would have increased drilling setbacks to 2,500 feet from any occupied dwelling, church, school or public facility. The same setback would also apply to any area that regulators chose to define as “environmentally sensitive.” Given the undefined, nebulous nature of that provision, the reality was that Prop 112 would have served, for all intents and purposes, as a moratorium on oil and gas in the state.

Bentley and CPC helped lead the effort to beat back Prop 112, and it was defeated by a 12-point margin in that election. At the same time, though, voters chose to elect Democrat majorities to both houses of the Colorado Legislature, and they proceeded to pass a series of anti-oil and gas bills during 2019. Bentley said it was hard to see that happen, but shortly after that Nov. 2018 election, another opportunity would come her way.



IN ANY STATE, THE REALITY IS THAT AN OIL AND GAS BOOM BRINGS WITH IT A DISCREET SET OF WELL-KNOWN LOCAL IMPACTS



“Shortly after the 2018 election that I had a couple of colleagues in the energy industry call to ask me if I had ever heard of the Permian Strategic Partnership,” she said, “and I had not. They described it to me, and I said, ‘Wow, there’s nothing anywhere like that that I’ve heard of.’”

Bentley was intrigued by the mission of the PSP, in large part because it presented an opportunity to work on issues on a proactive basis. “The more I looked at it, the more excited I got. I love the energy industry — it’s something that I feel very passionate about,” she told us. “I got really accustomed to playing defense, and I think I played it very well, but it’s not very often that you get to play offense for an industry that you love, and have that opportunity in such a powerful way.

“Anyway, long story short, the stars aligned, and they hired this Colorado girl to move to West Texas and run the Permian Strategic Partnership. And I have to say, I can’t believe it’s already been a year. All the things we’ve accomplished in 10 months, it’s been truly amazing and I feel so blessed.”

Indeed, it has been.



A PARTNERSHIP IN EVERY SENSE OF THE WORD

When you listen to Bentley talk about the PSP and how it functions, you hear a lot about the word “partnership” and its various iterations. Though the PSP’s budget is quite robust, it quickly becomes obvious that this is not an operation that is focused on just throwing money at problems. The goal instead is to partner with a variety of stakeholders to support long-term solutions that will serve to make life better for everyone.

“The companies involved with the PSP will bring people, expertise, resources and leadership to develop solutions in partnership with local leaders and communities,” Bentley told us. “So, initial research was done before PSP was officially announced, and it showed to really move the needle, and in order to avoid missing the opportunity for this basin to grow in a very smart, efficient manner, we needed to put our both employees’ time and resources, and our money into five key areas. Those areas are education, healthcare, housing, roads, and workforce.

“We have a committee of reference for each of those committees that is tasked with going out into communities across the Permian Basin and saying ‘Ok, in each of these areas, what is lacking in order to make your community a world-class place to live?’ It sounds daunting, and it is, because these areas are large — the Permian Basin is a massive geographical area.

“What I’ve found, in being here for 10 months, is the word ‘Partnership’ becomes really key. If there is a community that just feels passionately about a healthcare project, an education project, a road project, anything that fits in our five areas, we want to walk through what a solution could look like with them. What is the reach of the impact this project will have? Is it sustainable? Will it move the needle in a significant way? These are some of the questions we ask.

“And finally, if the Permian Strategic Partnership isn’t here in 10 years, will this project exist and continue to serve the community that it was intended to serve? Those are our criteria for projects.”

When we pointed out that the functioning of the PSP sounded similar to being on the board of a corporate or private charitable foundation, only with more focused employee involvement, Bentley agreed. “It’s very, very similar,” she said. “That’s exactly right. We funded over \$30 million in the last nine months of 2019, and we have some pretty amazing projects. I love that they are all unique and across the board.”



Bentley noted that the PSP is not intimidated by the size of any project. “We will take on projects of all sizes,” she said. “For example, we were one of several funders to fund seven charter school campuses across the Midland/Odessa area. We did this for several reasons: For both capacity reasons and to hopefully raise the quality of education, not just for those in the charter schools, but for those in the entire region.

“Not too long after, we funded an initiative in New Mexico, in Lea and Eddy Counties. We gave each \$250,000 to provide professional grant writing resources with the hopes of leveraging it into so much more. And we are so thrilled. We launched that project mid-last year, and we’re already seeing grants that we knew that those communities qualified for, but it takes resources to get resources. I have a feeling that we’ll be talking in the not too distant future about an amazing rate return on those.”

Bentley gave us another example of an instance where it takes resources to get resources, this one a transportation-related project the PSP has taken on in Southeastern New Mexico. “The state of New Mexico was not getting their fair share of federal build grants in our opinion, to help with those critical, priority stretches of road, that this entire basin desperately needs and certainly southeast New Mexico needs. But the New Mexico Department of Transportation did not have the resources to apply for that grant, so we provided the state with \$80,000 for what we would consider one of the best transportation grant writers in this area, maybe even in the country, and said ‘Let’s go get a build grant.’ And so, for \$80,000 New Mexico got a \$12.5 million build grant, and that’s the kind of rate return we look for.”

These projects, and the others PSP plans to take on in the future, are all selected with the group’s core mission in mind. It’s not about throwing money around; it’s about partnering with communities in ways that are both impactful and sustainable over the long haul.





INVITING OUT – OF – THE – BOX IDEAS

As one might imagine, the expanse of the Permian region and the large number of communities within it create a great deal of work to be done. With that work comes a great deal of travel. The PSP’s member companies did not want to create an organization with a huge number of employees, but they do make many of their own employees available to help handle the load. Bentley finds the contributions by those company employees to be invaluable.

“We rely a lot on our committee members,” she said. “They are the ones who are out in rural Texas and southeast rural New Mexico putting in an immense amount of time and doing a lot of hands-on work. I can also tell you that an ideal day for me is absolutely much of the same. It’s not sitting in Midland in my office, although at times that is necessary, it is out meeting with our Permian Basin communities and talking about what is possible and new people, new ideas that they want to put on the table.

“One of my favorite things about it, and there are so many, is that we invite out-of-the-box ideas because we feel like if there’s an existing

idea and it solved our challenges, we would have already implemented it, and there would be no need for this. We love out-of-the-box ideas that often end up being part of very practical solutions.

“I also have a very talented, motivated staff, albeit small, but we’re in the basin a lot making sure that, even when we don’t get to make as much one on one contact as we would like, that people understand that they can pick up the phone and call us or email us at any time. This has been proven to be key.

“We have started a periodic newsletter that provides a ‘here’s what’s going on at PSP now.’ So everybody knows what we’re working on in what areas, and we’ve gotten a lot of positive feedback from that.

“Every now and again I go to Santa Fe, Austin, and Washington D.C. to work with our leaders and help them better understand the importance of the Permian Basin not only to the state of Texas and New Mexico, but to this country and the world. We have had great success partnering in all three of those cities, but our priority is right here at home in the Permian. This is where the majority of our time is spent, by design.”



FEELING AT HOME IN MIDLAND

For Bentley and her husband, moving from their longtime home in Weld County to the vast, West Texas desert was a big decision. But



DON'T EVER
WASTE A CHANCE TO
WANDER.

as things turned out, the couple felt almost immediately at home.

“Our children graduated high school a year before we left. So, they are in college right now and did not make the move with us, and that made the decision and move easier on our family as a whole,” she said. “But we came down to visit Midland, and it had much of the same feel and character of rural northern Colorado — we fell in love with it almost immediately.

“We are not ‘city people.’ We prefer the rural feel and the rural setting, and Midland very much has that. We love living in a community that appreciates and understands the energy sector, and certainly, that is Midland, Texas. Not to mention the sense of pride and strong moral character that is embedded in the fabric of Midland and across the Permian has been amazing and overwhelming. We immediately felt welcomed, when people said, ‘Welcome to Midland and we are thrilled you are here.’ We were immediately embraced in the community, and that made it an even easier transition. The Permian Basin is one of the most unique, special places anywhere.

Bentley immediately went about getting involved in her new community. It should surprise

no one that she has sought out projects that involve partnering with others.

“One of my proudest endeavors, since I’ve been here, is serving on the steering committee for Priority Midland and Opportunity Odessa. And those are two opportunities and projects very much align with the PSP mission. Both are comprised of the thought leaders of each community and getting to know them has been a wonderful experience.

“These are people who care deeply about their communities and want to create real change when it comes to infrastructure, education, healthcare, workforce and quality of life. I was excited to be invited to participate in these local efforts. It has been an amazing experience.”

It’s been a whirlwind first year in Midland for Tracee Bentley, and rapidly-evolving business conditions are conspiring to ensure that the busy pace of her day-to-day activities will only continue to accelerate. But she is already integrated within her community, meeting the goals of her mission, and energized and excited about the prospects to come. There can be little doubt that, for the PSP and its member companies, she is the right person in the right place at the right time.



About the author: David Blackmon is the Editor of SHALE Oil & Gas Business Magazine. He previously spent 37 years in the oil and natural gas industry in a variety of roles — the last 22 years engaging in public policy issues at the state and national levels. Contact David Blackmon at editor@shalemag.com.



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The Ethanol Industry Could Not Exist Without the Oil Industry

By: Nathan Kaspar

With the 2020 election cycle dominating national news and the Iowa Caucus recently taking place, there was once again renewed attention on industries and debates relevant to the energy industry. Corn is king in Iowa, and you can't talk politics in that state without touching on farming and the ethanol industry specifically.

The very mention of the word "ethanol" likely has many readers rolling their eyes and looking to flip the page to something relevant to hydrocarbon recovery from the earth's crust. The oil and gas industry has often been seen to be at odds with ethanol, with the Midwest farmers and ethanol producers being the unwelcome guests at the energy production table. "King Corn" is invited to the party by government mandate and is sustained by a web of political interests and the unholy marriage of liberal environmental interests and deep-red Midwest Republican farmers.

While ethanol and oil producers could (and will) argue late into the night regarding the ethanol industry's viability outside of government mandates, it is worthwhile for both sides to pause and look at where we are 15 years past the Energy Policy Act of 2005, which was the genesis of the Renewable Fuel Standard (RFS). While the marriage of the ethanol and oil industry might have been arranged, the union has survived, and American ingenuity has produced vibrant offspring benefiting multiple sectors of the economy.

An inconvenient truth that needs to be acknowledged: The ethanol industry could not exist without the oil and natural gas industry.

That truth goes well beyond the end-user fact that ethanol has to be blended with something to go into gas tanks. Ethanol producers are FANTASTIC customers of the shale gas industry and are completely dependent on natural gas to fire their boilers for fermentation processes. Each gallon of ethanol costs 15-21 cents of natural gas to produce. (131 billion gallons in 2018 earned natural gas suppliers over \$20 billion in sales).



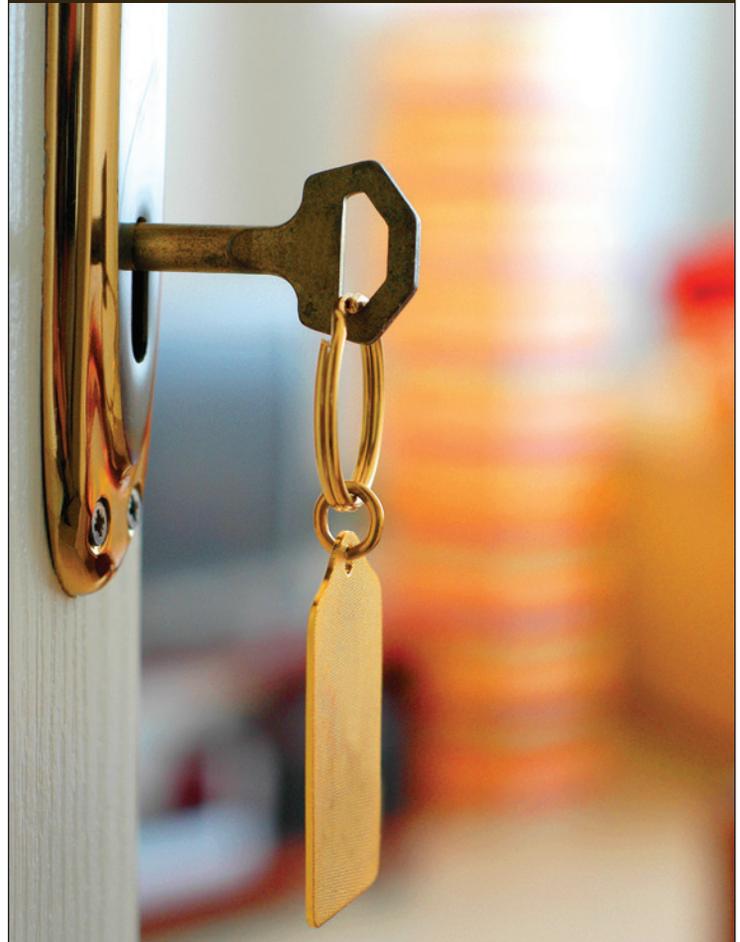
After ethanol is made, the remaining "wet cake" is often dried by enormous gas-fired rotary driers. The gas bill for a single rotary drier can be a million dollars per month, and large producers can have up to 16 of these driers (ICM boasts more than 400 still in use nationwide). The ethanol industry produces 40 million metric tons per year with the natural gas portion of drying costs upwards of \$30 per metric ton.

With all of these billions of dollars in natural gas just to produce ethanol and dry a portion of the waste product for the livestock industry, perhaps it is certainly true that the gas industry would not want to lose ethanol as a customer. This doesn't even take into account all of the petroleum products needed to raise the corn, get it to market, and the diesel trains and trucks to transport the product to blending and finally to market. But ethanol's dependence on the oil industry isn't what this article is about. Ethanol is likely "too big to fail" at this point, and our economy has adapted to include its use in a variety of ingenious ways.



About the author: Nathan Kaspar is a 2002 Graduate of the University of Texas. He is a 24 year (active and reserve) veteran Naval Aviator. His four-year civilian career has been as Chief of Staff for Dynamic Extrusion LLC, makers of All-American Feed.

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One industry that has been forced to adapt as ethanol production increased has been the beef industry. Corn has always been the largest U.S. feed grain, and with roughly 40% of the U.S. corn production going toward ethanol production, adjustments had to be made. Due to government subsidies for ethanol producers, ranchers could not compete with the buying power of ethanol producers and have had to develop efficiencies in their operations. A common efficiency has been to relocate feed yards and slaughterhouses in close proximity to ethanol producers. Stockyards are focused on “finishing” animals by adding muscle and fat feed the “wet cake” distiller’s grain as the primary ingredient in their ration. The close proximity prevents the wet-cake from spoiling prior to feeding and saves the ethanol plant from the expense of drying grain to add shelf life.

The livestock feed industry has also been forced to adapt over the past 20 years due to ethanol production. Virtually every feed bag for bovine, equine, sheep, goat and big game list “distiller’s co-products” as their first ingredient. This is due to the high protein and fat (energy) content that remains after the starches from corn are converted to ethanol. Every bag of animal feed at feed stores across the U.S. is made possible by natural gas-fired dryers processing waste from ethanol production.

EVERY BAG OF ANIMAL FEED AT FEED STORES ACROSS THE U.S. IS MADE POSSIBLE BY NATURAL GAS- FIRED DRYERS PROCESSING WASTE FROM ETHANOL PRODUCTION

Dedicated entrepreneurs in the feed industry have been working to further advance feed production technology for the processing of distiller’s grains. Original Equipment Manufacturers (OEMs) such as Rayeman Elements LLC and producers such as Dynamic Extrusion LLC have developed and deployed advanced production technology that can produce feed products from dry distiller’s grain that does not require binders and fillers. Feed production methods developed prior to the abundance of distiller’s grain required nutritionless binders and fillers to be added, which reduced the efficiency of the feed and increased costs on their feed bill by putting out diluted feed.

Texas landowners who have benefited directly and indirectly from the shale oil boom are now able to leverage these new feed products to feed livestock and big game that are grazing on land that is producing shale oil and gas. The pure distiller’s grain feed is beginning to be distributed throughout north and central Texas, with both the beef and big game markets taking note that the lack of starch is perfect for ruminant animal health.

As the economy continues to expand, it is important for all members of the oil and gas industry along with ethanol farming and ranching to understand how each sector benefits and depends on each other. Further educating the consumer base and electorate can serve as a hedge against dramatic policy swings along the election cycle which could threaten different sectors and the economic stability of the nation. Shale goes well beyond heat and fuel. Ethanol goes well beyond that 10% sticker at your pump. Kumbaya.

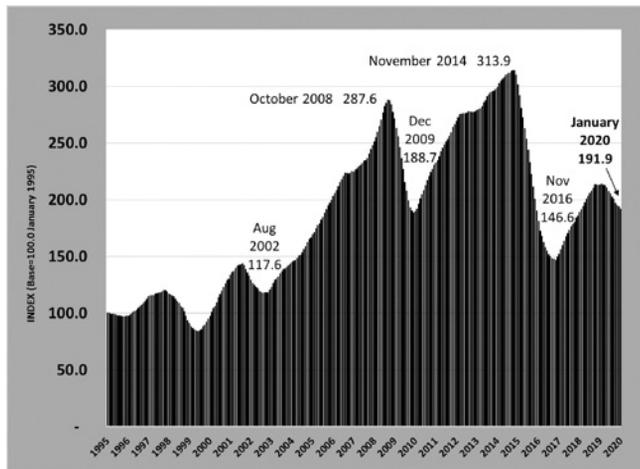
Energy Markets in Turmoil

By: Karr Ingham

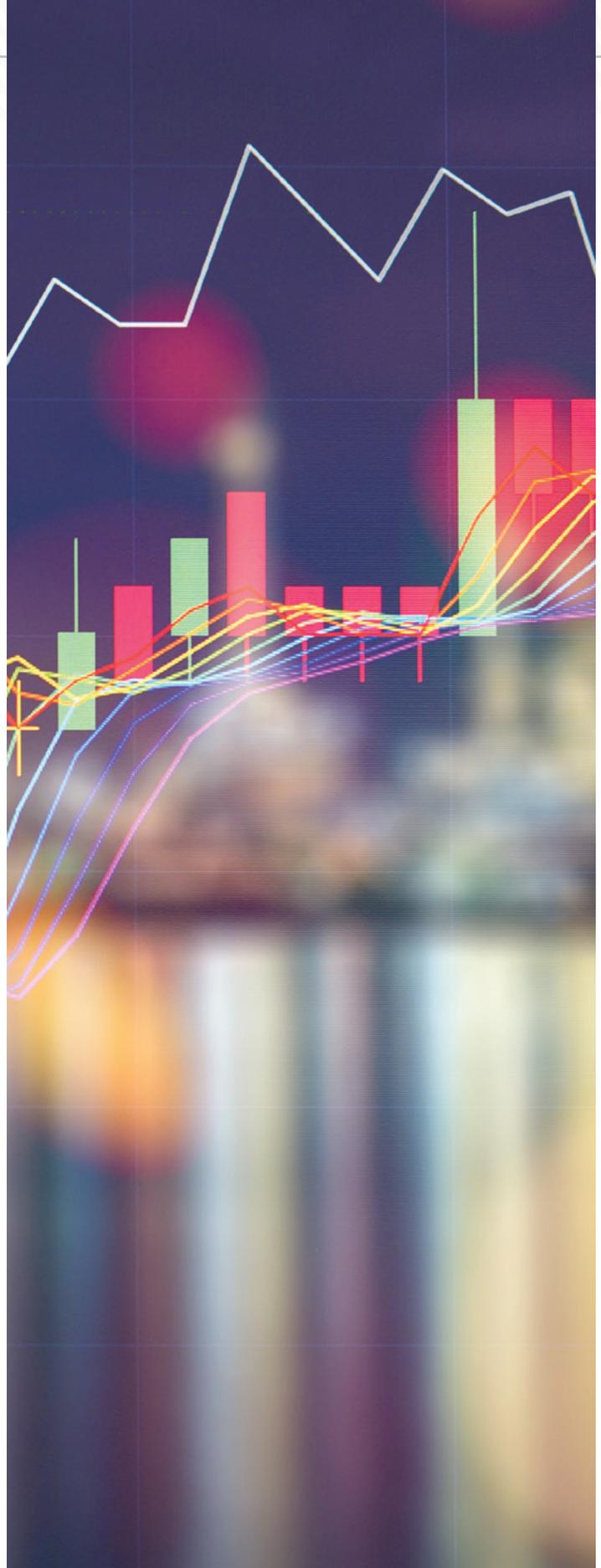
Things have gone from bad to worse. Following a year of lackluster oil pricing and a general decline in oil and gas E&P activity in Texas in 2019, oil markets are now reeling from the fallout of the coronavirus and its impact on energy demand growth in the U.S. and globally. What was poised to be another difficult year for the oil and gas industry in 2020 has now become something of a train wreck.

The Texas Petro Index measures growth rates and business cycles in the Texas upstream (exploration and production) oil and gas economy in Texas. The TPI is based on 100.0 in Jan. 1995. The most recent cycle of industry expansion began after the index troughed in Nov. 2016 following two years of sharp and debilitating contraction. That cycle of growth essentially came to an end in the fourth quarter 2018 with a sharp drop in oil prices. The index began to decline in earnest in March 2019 and has declined for 11 consecutive months March 2019 - Jan. 2020 (inclusive). That trend was set to continue this year, and the downward pressure has gained considerable momentum in the first quarter of 2020 thanks to COVID-19, otherwise known as the coronavirus.

The Texas Petro Index 1995-2020

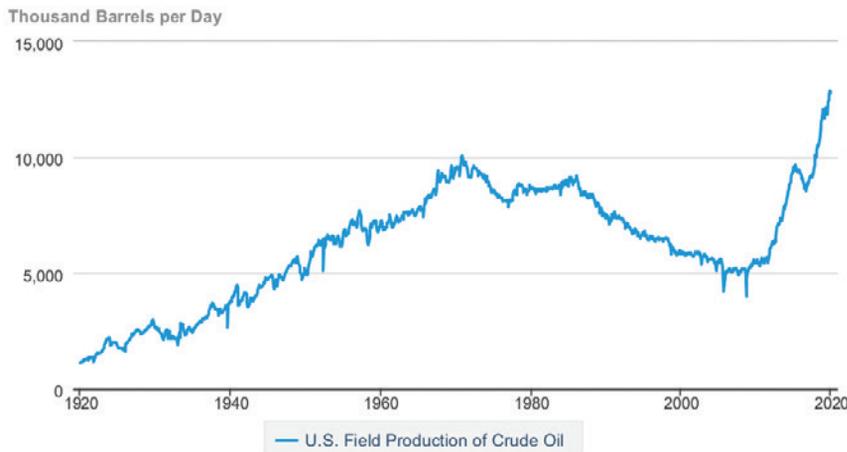


Source: Texas Alliance of Energy Producers



At the heart of the matter is the simple fact that domestic and global petroleum markets are and have been amply supplied, a trend that was magnified with continued production increases in 2019. Even as the rig count, drilling permits, and industry employment declined throughout the year, U.S. crude oil production set yet another annual record at nearly 4.5 billion barrels, an increase of over 11% compared to the 2018 annual total. Over 41% of that production came from Texas, which also set another new annual record at 1.85 billion barrels for the year, an increase of 15% compared to the 2018 annual production.

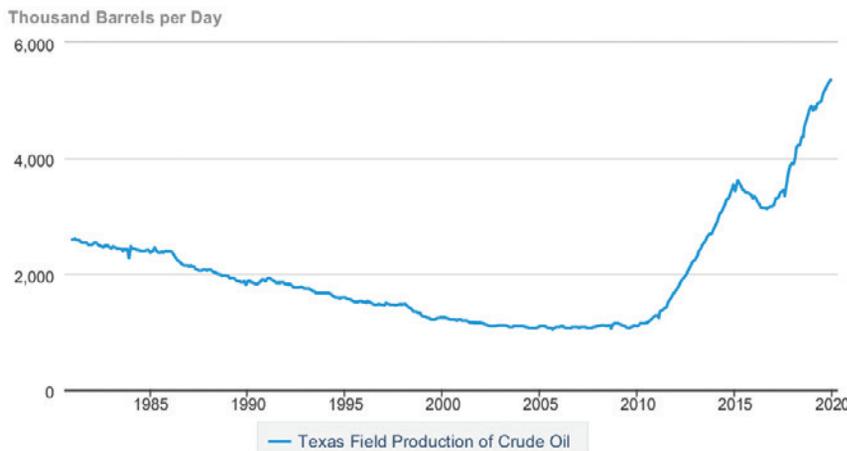
U.S. Field Production of Crude Oil



eia Source: U.S. Energy Information Administration

It is U.S. (led by Texas) production growth that continues to push global crude oil production ever higher, and implied in the supply growth is the necessity to maintain a strong U.S. and global economy with accompanying energy demand growth sufficient to continue to absorb the ever-higher levels of production.

Texas Field Production of Crude Oil



eia Source: U.S. Energy Information Administration

(continued on page 40)

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About the author: Karr Ingham is an Amarillo, Texas economist, and is the owner and President of InghamEcon, LLC, an economic analysis and research firm specializing in statewide, regional, and metro area economics, and oil & gas/energy economics.

The first hit to the global economy was the trade war, largely between the U.S. and China, which undoubtedly weakened the two largest energy-consuming economies on the globe. Trade wars, characterized by tariffs and protectionism, are virtually always economy-slowing events because the broad consumer economy takes a significant hit in the form of higher prices for a massive range of goods and services.

Even at that, crude oil prices averaged about \$57 in 2019 for West Texas Intermediate, with posted prices for WTI averaging about \$53.50 with very little change over the course of the year. The declines in the rig count and drilling permit numbers were slowing the rate of production growth nationally and in Texas, as markets were working to align supply with the evolving demand scenario.

In 2020, however, demand began to take new hits with the spread of the coronavirus and the growing alarm that has come with it. China — again as the second-largest energy consuming economy in the world — is ground zero for the origination and spread of the virus is an especially nasty punch to the face of crude oil markets. The drop in demand is evident in U.S. crude oil exports to China. While 2020 monthly data is not yet available, monthly crude oil exports began to decline in the second half of 2019 from a high of 8.75 million barrels in June to a paltry 536,000 barrels in December. Estimates of demand growth in China have been increasingly ratcheted downward and at present Chinese demand growth is expected to be non-existent in 2020 and will probably decline before all is said and done.

The same is true of the global demand picture. What was originally expected to be global demand growth of over 1.1 million barrels per day has now gone negative, with the dramatic decline almost exclusively the result of the coronavirus. The International Energy Agency (IEA) now expects global demand to actually decline in 2020 for the first time since the global recession of 2008 - 2009, anticipating a demand drop of 90,000 barrels per day, again compared to expectations only months ago of global demand growth of over 1.1 million barrels per day.

The shift in markets for the worse began to prompt discussions by Saudi Arabia, OPEC, and Russia to consider a coordinated pull-back in production to help prop up crude oil prices. The idea, of course, is to adjust supply downward in response to the worsening demand scenario.

The expectations for just such an agreement were growing during the week of March 2, and these expectations seemed to be baked

into crude oil markets going into the weekend of March 7-8. And that's when things fell apart. Over that weekend, Saudi Arabia pushed for yet deeper production cuts by "OPEC+" (OPEC and other non-OPEC producers—Russia most notably).

Russia balked at those cuts and the weekend came and went without an agreement to cut production. The response in crude oil markets was swift and brutal; daily posted crude oil prices, which had already lost \$17 a barrel since early January by Thursday, March 5 to \$37.75 on Friday, March 6. The daily Plains All-American posted price on Monday, March 9 was \$27.75, a drop of \$15 a barrel in just two business days, and a decline of \$32 a barrel since reaching \$59.75 on Jan. 6, 2020, a decline of some 54% in two months. (This article was completed and submitted the morning of March 10.)

Not only did OPEC+ fail to agree to production cuts, Saudi Arabia in response to Russian reticence indicated it would actually increase production to a record 12.3 million barrels per day in the near term compared to current production of 9.7 million barrels per day, in what can only be described as a move to "flood the market" to achieve a geopolitical end. The scuttlebutt is that the Saudis are targeting Russia with the increased production, and that may well be the case as Saudi Arabia stands to lose the most in terms of market share absent Russia's participation in the deal.

The ultimate result, however, is to put U.S. and Texas operators squarely in the line of fire in this standoff between Saudi Arabia and Russia. Both countries would clearly prefer that the U.S. provide the necessary production cuts to achieve a better market balance. But they are wary of waiting around for this to happen, having been burned by that strategy in 2016. And they know that any attempt by OPEC/non-OPEC to cut production to raise oil prices means that production cuts in the U.S. will not be as steep, if they even occur at all.

This is the essence of the great frustration that the United States provides to other crude oil-producing countries, Saudi Arabia and OPEC along with Russia in particular. Unlike those and most other producing countries in the world, there is no central mechanism for reducing crude oil production in the U.S. Production levels in the U.S. are simply the result of the decisions of thousands of individual private companies acting in their own best interests, rather than a collective best interest.

While most OPEC countries, certainly Saudi Arabia, as well as Russia, can produce crude oil much less expensively than can most U.S. shale producers, that is not actually the driv-

ing force behind their production decisions and their attempts to maintain prices at certain levels. Oil revenues provide the lion's share of revenue to those governments and the massive social structures they support. They may talk a big game in the short term, and they may indeed decide to employ the market-flooding strategy for a while just to see if it (1) brings Russia back to the table, and/or (2) results in an observable significant production slowdown in the U.S. But the economic realities in those countries will force their hand at some point, and this will almost certainly not be a workable long-term strategy for that reason.

We should acknowledge, and do so with great pride, that oil and gas producers in the United States, with Texas leading the way, have utterly upended the global crude oil supply picture. The U.S. alone has added nearly 8 million barrels per day over the last 11 years with production growing from about 5 million bpd in 2008 to 12.8 million bpd at year-end 2019. Of that nearly 8 million bpd in U.S. production growth, 4.3 million bpd of that growth came from Texas, which has more than quadrupled its crude oil output from 1.1 million bpd in 2008 to 5.4 million bpd at year-end 2019.

U.S. production may peak and begin to decline at some point in the coming months in response to falling prices. It is instructive to note, however, that in response to an 80% price decline 2014—2016 and a 75%-80% decline in the rig count U.S. daily production declined by less than 12% - and it took 17 months for that to happen. Who knows, it may be different this time, but those who would profess to make a living predicting fast and sharp production declines in the U.S. would have gone broke multiple times over.

And while it is difficult to suggest, a slowdown in the U.S. (and Texas) E&P activity may indeed assist in aligning global supply and demand, and at the same time slow the incessant progression of unwanted growth in natural gas production.

What the current shock may do, however, is further endanger the U.S. and Texas independent producers, and small independents in particular. It is this group of operators with which the Texas Alliance of Energy Producers is most greatly concerned, and for whom we stand in the gap. For that reason, and for the health and prosperity of our global neighbors, here's hoping coronavirus as a global phenomenon begins to evaporate sooner rather than later and Texas oil and gas producers can get on with the business of providing consumers with a steady, abundant, affordable supply of energy for the near term and the long term.



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CLAYTON WILLIAMS: Legendary Texan

By: David Porter

This past February, Texas lost one of the great characters that made it a successful state. Clayton “Claytie” Williams died in Midland, Texas on Feb. 14, 2020. This article is not written to be an obituary but as a series of recollections of my memories with one of the larger than life legends of the Texas oil patch.

One of my greatest experiences having served on the Texas Railroad Commission was meeting several great Texas oilmen. Williams certainly was one. It would be exaggerating for me to claim a close acquaintance with Claytie, but I knew him. As someone who lived in Midland, Texas, from the early 80s until after winning the Republican Primary for Railroad Commissioner in 2010, and was active in civic and political affairs, I ran into him numerous times at events and occasionally around town. During the 1980s he probably spoke to every organization I was a member of at one time or another. While serving as Texas Railroad commissioner, I had a number of conversations with Mr. Williams both in person as well as over the phone.

My earliest recollection of Clayton Williams is at a luncheon at which he gave a speech to, what I recall being, a Midland Jaycees meeting. He made a statement there that I remember to this day. He said something to the effect, “It’s not so much the deals you do that make you rich — it’s the deals that you don’t do that make you rich.” Claytie was an entrepreneur — not only was he an oilman, he was also a rancher, banker, real estate developer, founder of ClayDesta Communications and a pipeliner. During the mid-1980s, as well as other times in his life, Clayton was close to broke, but he always came through — sold some assets or started another business and survived to win another day. He may have had more ups and downs in his net worth than any other person I have known. I remember a meeting about seven or eight years ago in his office in Claydesta Plaza, where I asked him why he thought he had so many successes in his life? He immediately answered, “Because I had so many failures. I tried a lot of

things, some worked and some didn’t. I took the lessons of my failures and turned many of them into successes.”

At the last meeting I had with Claytie in his office, we talked of many things including the Austin Chalk and running for office. When I told him I had a place in Lee County between Dime Box and Giddings he got excited and started talking about old times in the Austin Chalk Giddings field in the late 70s and early 80s.

Clayton Williams was one of the largest leaseholders in the Austin Chalk play. He took me back into another part of his offices and showed me some maps of the Chalk and where leases were that he still owned. He told me he was holding on to those properties because he was convinced there was going to be another oil boom in the chalk.

Subsequent to that meeting, he sold his oil and gas properties — but he was right, this area is undergoing a burst of oil and gas activity. Drilling, leasing and building pipelines are all going full scale at the present time.

We talked about what it was like to run for a statewide office in Texas. I told him that I had read his biography shortly before running and that it had further fortified my belief to avoid the press when possible. The hostility of the press towards conservative Republicans has only increased over the last 30 or so years. We discussed how history might have been different if he had won that 90s gubernatorial race. If he had won that race, he probably would have run for reelection in 1994. George W. Bush in all probability would not have run that year for Governor and likely would not have been in a position to run for president in 2000. Of course, there is no way of knowing what would have happened if Clayton W. Williams, Jr. had been elected Governor of Texas. Regardless, he made his mark on Texas history. Claytie was the quintessential Permian Basin entrepreneur. When I think about West Texas and Midland, I think about oil, ranching and a never-give-up spirit — all three of which Clayton W. Williams Jr. embodied.

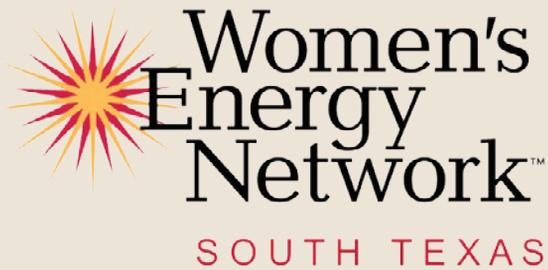
WHEN I THINK ABOUT WEST TEXAS AND MIDLAND, I THINK ABOUT OIL, RANCHING AND A NEVER-GIVE-UP SPIRIT — ALL THREE OF WHICH CLAYTON W. WILLIAMS JR. EMBODIED



About the author: David Porter has served as a Railroad Commissioner (2011–17) and Chairman (2015–16), as well as Vice Chairman of the Interstate Oil and Gas Compact Commission (2016). Prior to service on the Commission, Porter spent 30 years in Midland, Texas, as a CPA working with oil and gas producers, service companies and royalty owners. Since leaving the Commission, Porter works as a consultant for oil and gas companies. He also serves as Chairman of the 98th Meridian Foundation, a nonprofit concerned with water, energy and land issues.

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Playing the Long Game

By: Bill Keffer

There is something about getting older — age brings experience, which can often appear to be wisdom. Wisdom can also come from intelligence and education. But, in the end, older folks who might not have much formal education and might not score well on a standardized test can still come across as wise. Age provides a long view that can only come as a result of having lived through certain times and events.

I graduated from law school and became a licensed lawyer in 1984. Since that time, there have been no fewer than six “busts” in the crude oil market. I can remember a local Rolls Royce dealership in Midland advertising in the 1980s something about buying a new Rolls Royce and they would throw in a new jet airplane — or vice versa. It was so over the top that it was hard to comprehend the actual offer. That, of course, happened during one of the “boom” times. A bust came along not too much later, and hard lessons had to be learned all over again. A local steak restaurant was opened in Midland shortly thereafter; it was called “Tanstaaf.” Everyone assumed it was owned by someone from the Middle East, and that was his last name. It turned out that it was an acronym for “there ain’t no such thing as a free lunch.” Ain’t it the truth!

The boom-bust cycle is as much a part of the oil and gas business as gushers and dry holes. People in the business know that it’s going to happen. It’s a global commodity that is influenced by an endless list of factors, most of which are as unpredictable as the weather in West Texas.

It has always been a part of the industry, and companies have had to learn how to adapt or die. I remember in my final interview with ARCO Oil & Gas Company’s general counsel for a job in their legal department in 1987, he boasted about how ARCO had reduced headcount through its generous early-retirement program and taken other aggressive budget-tightening steps to be able to turn a profit at \$10 a barrel crude oil prices.

The other repeat victims of the boom-bust cycle have been the towns that live and die with the price of crude oil. Midland has been the perennial poster child for the great times during booms and the barren



times during busts. Oilmen spent like drunken sailors when prices were high; but when the busts came, they filed bankruptcy and/or packed up and left town. As a result, it was always hard for Midland to ever get traction and enjoy any kind of sustained growth.

When the 2015 bust arrived, it was expected by those living in Midland that the industry would once again pack up and head for higher ground and return one day in the future when crude prices recovered. Instead, not only did no one leave, they doubled down and declared their intentions to stay for the long term. Concho was in the middle of building a huge campus for their employees. Instead of stopping construction when the bust hit, they didn’t miss a beat because they saw something this time that hadn’t been present in past busts. Chevron laid off employees at their offices around the world; everywhere but in Midland. Anadarko decided to build a new office complex in Midland. Everyone who was already in Midland at the time stayed; those who were making plans to build a presence in Midland came anyway. What was different this time?

The massive reserves that have been confirmed in the tight-shale formations in the Permian Basin that are now accessible by hydraulic fracturing and economic because of hori-



THIS IS AN UNPRECEDENTED COMMITMENT BY AN INDUSTRY THAT IS NOT PLANNING TO PACK UP AND LEAVE WHEN THE NEXT BUST COMES ALONG

zontal well technology showed these companies that there is more than enough reason to plant roots in Midland-Odessa, throughout the Permian Basin, and into New Mexico in Hobbs, Carlsbad, and Lovington. Those kinds of reserves justify long term commitment and weathering the periodic downturns in crude prices.

Once it became apparent that the industry was staying, it also became obvious that the local infrastructure had never had to grow during the previous booms because the excess population had always left during the busts, so there had been no reason to invest in expanding roads, schools, hospitals, and the other needs of a growing urban area. And, knowing how slow governmental en-

titles are to respond to such things, the oil and gas industry realized that more would have to be done faster to attract the employee population these companies would need to succeed.

The result was the creation of the Permian Strategic Partnership. Nineteen oil and gas companies came together in 2018 and pledged \$100 million to help Permian Basin communities build the infrastructure for the area to be able to support the natural resource economic engine that began one hundred years ago and is more prolific now than ever before. The member companies are Apache, BPX Energy, Chevron, Cimarex, Concho, ConocoPhillips, Devon, Diamondback, Endeavor, EOG Resources, Halliburton, Occidental, Ovintiv, Parsley Energy, Pioneer, Plains All American, Schlumberger, Shell, and XTO Energy.

In less than two years, the PSP has already committed \$16.5 million, in conjunction with other area donors, for a total of \$55 million to enlist IDEA charter schools to open 14 schools at seven sites across Midland and Odessa by the 2024-25 school year. These schools are expected to add nearly 10,000 quality seats to the two cities by 2030.

The PSP has committed \$10 million of the \$50 million total to be put towards the Hobbs, New Mexico public school system's plan to help fund construction and development of a new technical education high school to serve a growing number of students and better prepare them for technical jobs available across the Permian region.

The PSP has also partnered with other area organizations to provide professional grant writing, management, and training expertise to local governments, school districts, and non-profits by providing \$250,000

each to Lea and Eddy Counties in New Mexico to strengthen their ability to successfully compete for state, federal, and private grant programs.

In January, the PSP announced that it is making a \$5.9 million contribution to Texas Tech University Health Sciences Center School of Medicine to expand healthcare resources to Permian Basin communities. Working in a predominantly underserved area, Texas Tech trains and encourages medical residents to plant their roots in West Texas. And the PSP is just getting started.

This is an unprecedented commitment by an industry that is not planning to pack up and leave when the next bust comes along. With that kind of long term commitment, the Permian Basin has an incredibly bright future ahead.



About the author: Bill Keffer is a contributing columnist to SHALE Oil & Gas Business Magazine. He teaches at the Texas Tech University School of Law and continues to consult. He also served in the Texas Legislature from 2003 to 2007.

Energy Density Trumps Climate Policy

By: Robert L. Bradley, Jr.



Fossil fuels are winning in consumer-driven, taxpayer-friendly energy markets, clouding political attempts to control greenhouse gas emissions associated with natural gas, coal and oil. Despite governmental policies to shift grid electricity to wind and solar, and to jump-start electric vehicle markets, it is still a fossil fuel world, with much more growth anticipated.

Globally, the market share of fossil fuels is 85%. Total usage of natural gas, coal and oil since 1988 (the year global warming first became a major issue) has increased by more than two-thirds, with CO₂ emissions rising 63%.

Looking ahead, the U.S. Energy Information Administration forecasts that global energy demand will grow by nearly half by 2050, led by industrializing India and China. Most of this increase is expected to be met by fossil fuels, resulting in carbon dioxide (CO₂) emissions increasing 0.6% annually. The U.S. is at the center with oil and gas, while the developing world is driving increased global coal consumption (China, India and Africa in particular).

New supplies and long-lived infrastructure investment are daily news. From record oil and natural gas production to new pipeline build-out to surging exports of oil and liquefied natural gas to a domestic and international petrochemicals boom, the U.S. is leading the way. Supply creates its own demand, explaining why forecasts of peak demand are going the way of peak supply.

Why fossil fuels? Why the political failure of federal cap-and-trade in 2010 in the U.S., as well as state-level carbon tax proposals? Why the failing international attempts to effectively regulate the same, from the Kyoto Protocol of 1997 to the Paris Climate Accord of 2015?

Finally, why do politically favored energies — biofuel, wind, solar and electric vehicles — stubbornly depend on government mandates and disproportionate tax favors? The U.S. Production Tax Credit for wind, for example, just received its 12th extension since the original law was enacted in 1992.

The short answer is relative energy density. Oil, natural gas and coal are the sun's work over the ages. Physical stock, with built-in storage, compares to the very dilute, intermittent flow of photons and wind. Superabundant, each fossil fuel is scalable, unlike wind and solar that require much more infrastructure, including surface area, to turn its free energy input into usable electricity.

Density explains why renewables are the energy past and stock energies the present. Renewables (primarily biomass and falling water) were humankind's lot for most of recorded history. Beginning in the 18th century, coal emerged to fuel the industrial revolution. Oil joined in the 19th century, and natural gas came of age in the 20th. Statistically, the market share of energy has gone from virtually 100% renewable to predominantly fossil fuels today.

"The great dramatic shift to mineral energy is the very basis of technological progress," University of Texas economist Erich Zimmermann stated 70 years ago. "One could almost concentrate the whole history of economic development into this simple transition: man power to animal power to machine power."

The economics of energy density drive climate policy, not the other way around. Voters are sensitive to increases in gasoline and diesel prices, the most transparent, advertised commodities in the world. Electricity is a household staple that must be available and affordable every second of every day.

Democrats, not only Republicans, in fact, have turned fossil-fuel friendly when public opinion and campaigns were on the line. "I have made it clear in this campaign that I am not calling for any tax increase on gasoline, on oil, on natural gas, or anything else," stated Al Gore on the Presidential campaign trail in 2000.

President Obama, facing public unrest over rising oil prices in 2012, went to oil-mecca Cushing, Oklahoma to announce that "we are drilling all over the place," and "my administration has approved dozens of new oil and gas pipelines over the last three years." Obama three years later signed a law to legalize oil exports for the first time in 40 years — a driver of today's U.S. hydrocarbon boom.

Expect this year's election to taper down talk of a Green New Deal. It's energy economics driving politics, not the other way around. Mineral energies, in this regard, have a long future, not only a storied past.



About the author: Robert L. Bradley Jr. is founder and CEO of the Institute for Energy Research and author of eight books on energy history and public policy.

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NEPA Reforms and Their Impact on Shale

By: Kevin Mooney

Environmental activists who have been critical of President Trump's proposed regulatory reforms have engaged in abusive litigation practices that delay vital infrastructure projects making it necessary to revisit the federal rulemaking process, according to congressional figures and energy policy analysts.

In January, Trump detailed his proposed overhaul of the 50-year-old National Environmental Policy Act (NEPA), which has not been amended since 1986. The "endless delays" now associated with the environmental review process "waste money, keep projects from breaking ground, and deny jobs to our nation's incredible workers," the President said during a press conference at the White House. He was joined by cabinet and industry leaders during the announcement.

"America is a nation of builders," Trump continued. "It took four years to build the Golden Gate Bridge, five years to build the Hoover Dam, and less than one year—can you believe that?—to build the Empire State Building. Yet today, it can take more than 10 years just to get a permit to build a simple road—just a very simple road. And usually, you're not even able to get the permit. It's unusual when you get it. It's big government at its absolute worst, and other countries look at us, and they can't believe it."

NEPA stipulates that federal agencies must consider the environmental impact of any federal actions that could significantly impact the quality of the environment. The law also says that federal agencies must consider potential alternatives to proposed actions. Current regulations call for federal agencies to produce documents called environmental impact statements (EISs) in anticipation of any significant federal actions and to prepare environmental assessments (EAs) to determine if the environmental statement is necessary or to explain why it is not.

The Trump administration's reform package would set a time limit of two years for the completion of environmental impact statements and one year for the completion of environmental assessments. The proposed reforms would also specify page limits for NEPA reports and require "joint schedules" to be established across multiple agencies so workers and companies could have greater certainty in their planning. As part of its proposed NEPA overhaul, the Trump administration also seeks to "simplify" what is meant by environmental "effects" and to "clarify that effects must be reasonably foreseeable and have a reasonably close relationship to the proposed action" while also declaring an "analysis of cumulative effects" would no longer be required.

Green activists who view NEPA as a safeguard against the potential long-term effects of climate change have been particularly critical of the administration's efforts to redefine what is meant by environmental effects and its efforts to limit the scope of what is included in NEPA reviews.

Prominent opponents of Trump's regulatory rollback include the Center for Biological Diversity, a green legal advocacy group, based in Tucson, Arizona.

Brett Hartl, the Government Affairs Director for the Center for Biological Diversity, argues that litigation is needed under NEPA to keep the government accountable and to protect the public interest.

"Regarding NEPA, one of the two foundational goals of NEPA is to give every citizen a voice in how the federal government acts on its behalf," he said in an email. "And most of the thousands of NEPA processes (environmental assessments and environmental impact statements) are completed on time. Litigation—which is brought by all sides of an issue, industry and NGO alike—is the process to hold the government accountable to follow the law."

Hartl added:

"So, there are two ways of reducing litigation, follow the law or try to change the rules so the government doesn't have to follow the rules. That latter tactic is what the Trump regulations attempt to do — make NEPA so boilerplate and meaningless that there are no checks upon the power of the federal government. Whether or not Trump's changes — which are not in effect yet — will ultimately reduce litigation, or increase litigation is hard to predict. I don't think there will be less litigation, it will probably be worse as agencies try to come to grips with these completely new rules."

But it is precisely because nonprofit advocacy groups like the Center for Biological Diversity have continuously misused NEPA to the point where vital projects are needlessly delayed without any appreciable environmental benefit that the time has come to upgrade the law and improve its implementation, Rep. Rob Bishop (R-Utah) explained in an email statement.

"When NEPA was signed into law, it was originally intended to ensure that each federal agency carefully considered the environment when making decisions," the congressman said in the email. "However, NEPA has devolved into a tool for excessive litigation aimed at impeding necessary infrastructure projects. To boot, the myriad of lawsuits have left our military vulnerable as our judiciary system is exploited under the guise of environmental justice. For our foreign adversaries, such litigation serves as an inexpensive tool to reduce our military readiness and defense capabilities."

When he served as Chairman of the House Natural Resources Committee in 2018, Bishop led an effort to probe into potential violations of the Foreign Agents Registration Act, which requires anyone who acts as an agent of foreign principals "in a political or quasi-political capacity," to disclose that relationship periodically, as well as "activities, receipts, and disbursements in support of those activities," according to the Justice Department.

Although NEPA was initiated with good intentions, the time for reform is "long overdue," since it puts the U.S. at a competitive disadvantage, David Kreutzer, a Senior Economist with the Institute for Energy Research based in Washington D.C., explained in an email.



“Anti-development groups weaponized NEPA long ago to unconscionably delay important infrastructure projects,” he said. “While countries like Canada, Germany, and Australia approve most projects within two years, NEPA approval in the U.S. averages more than six years for certain projects and in some cases, the NEPA approval takes well over a decade. It’s time to end regulatory abuse that squanders taxpayer dollars and delays needed projects, while adding little to environmental quality.”

The Institute for Energy Research, a non-profit based in Washington D.C. that favors free-market policies in the energy sector, has created a database called Big Green Inc. that details the relationship between well-endowed, left-leaning foundations and green activist groups like the Center for Biological Diversity.

“Big Green Inc. has taken on the vast environmental network and provided key insights into these organizations’ political operations,” Tom Pyle, IER’s President said in a press release. “Big Green Inc., demonstrates the fact that the green left is mobilized by billionaire-funded foundations seeking to stop the de-

velopment of America’s traditional energy sources without offering a viable alternative to sustaining the progress that can be attributed to the widespread use of our vast natural resources. Free market activists must work to ensure that America’s energy future is not stolen by green pressure groups working to disrupt our energy producers and send us back to the dark ages.”

Even if Trump succeeds in implementing his NEPA reforms, Bonner Cohen, a Senior Fellow with the National Center for Public Policy, anticipates that green activists will still find ways “to tie up energy and other natural resources and infrastructure projects in court” by invoking environmental laws. But if Trump is re-elected, his judicial appointments could help to end abusive litigation practices, Cohen suggested.

“What has changed is the composition of the federal judiciary,” he said. “Trump’s judicial appointments are remaking the federal courts in a way not favorable to green groups. If Trump wins a second term, this trend will continue. Greens can still sue to stop this or that, but their prospects for ultimately prevailing will diminish.”

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DISADVANTAGE

Distilled Spirits Industry Boosts Texas Ag

By: Thomas Tunstall, Ph.D

Distillers in Texas continue to experience rapid growth, as evidenced by a recently released study by The University of Texas at San Antonio Institute for Economic Development, highlighting the economic impact on the state. For example, in 2008, only six distilleries reported production in Texas. By 2017, that number had risen to 127 establishments. As of October of last year, 162 distillers operated here. From 2000 to 2017, the industry grew at a 37% annual rate, far above the 4.1% average for Texas businesses. Exports from Texas distilleries grew from \$142.5 million in 2000 to \$375.5 million in 2017, nearly a 15% year over year increase.

Despite some success, on-premise sales restrictions still represent perhaps the greatest barrier to higher growth rates for the industry. Consumers that visit tasting rooms are limited to two bottles per person every 30 days. Individual distillers must cap on-site sales at 3,500 proof gallons per year — a short fuse for many companies. Liberalizing such sales restrictions would give an even greater boost to an increasingly vibrant industry.

Although most craft distillers in Texas remain relatively small to-date, one case study demonstrates the significant upside potential. Now a household name, Tito's vodka would certainly constitute the poster child for this emerging industry. Beginning in Austin in 1995, Tito's almost single-handedly charted the then nascent craft spirits industry. Built largely upon word of mouth marketing, Tito's now ranks as the

number one distilled spirit in the United States, outselling Smirnoff, Jack Daniel's, Fireball and Crown Royal. According to Forbes magazine, the company is worth an estimated \$2.5 billion.

A key element of the craft spirits industry is the upstream supply chain impact on the agriculture sector. Raw materials often sourced from Texas farms include a wide variety of agricultural products such as corn, rye, oats, sorghum, wheat, barley, millet, triticale, jalapeño peppers, prickly pear, grapefruit, oranges, apples, lemons, limes, grapes, black-eyed peas, peaches, pears, pecans, juniper berries and potatoes. The elaborate process of producing distilled spirits generally includes prepping, mashing, fermenting, distilling, aging and blending.

Interestingly, a growing trend with craft distillers in Texas constitutes the use of agave for alcohol production, traditionally labeled as tequila. The well-known trademarked tequila brand restricts production to Jalisco and a few municipalities in other states in Mexico. However, Texas distillers have begun to produce agave spirits labeled as such, as well as a category known as Sotol.

These and other trends surrounding the distilled spirits industry in Texas represent ripe opportunities for savvy entrepreneurs. The accelerating growth not only opens up new markets for farmers, but also presents opportunities for distillers in the form of increasing numbers of tasting rooms across the state. For distillers, such outlets provide an appealing attraction for visitors to enjoy authentic local tourism, while boosting the Texas economy at the same time.

EXPORTS FROM TEXAS DISTILLERIES GREW FROM \$142.5 MILLION IN 2000 TO \$375.5 MILLION IN 2017, NEARLY A 15% YEAR OVER YEAR INCREASE



About the author: Thomas Tunstall, Ph.D. is the senior research director at the Institute for Economic Development at the University of Texas at San Antonio. He is the principal investigator for numerous economic and community development studies and has published extensively. Dr. Tunstall recently completed a novel entitled "The Entropy Model."





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Blockchain in Energy

By: Praveen Jujjuvarapu

Blockchain technology is the simplest form of the public ledger and shared database that assists in identifying, tracking and tracing every transaction on the enterprise blockchain network. These transactions are recorded in the form of blocks. These blocks are added to the blockchain in a linear and chronological order. The blockchain technology provides secure sharing of information while making the process transparent and immutable for all the participants. The blockchain technology shows the various applications in the energy industry vertical, such as payments, data management, smart contracts, supply chain management and others. Blockchain technology in the energy sector would enable people to trade energy among themselves and transform their business operations and services by providing transparency and immutability.

Blockchain technology has the future to alter the energy sector. Innovations such as rooftop solar, electric vehicles, and smart appliances have been driving the energy industry. Enterprise Ethereum blockchain uses smart contracts and systems interoperability to stimulate growth in upcoming technology in which energy and sustainability are less recognized.

Blockchain also offers solutions for renewable energy distribution. To improve the efficiency of utility providers, the distributed ledger is being used to track the supply chain of custody for grid materials

Oil and gas companies are majorly concerned about privacy and trade policies. Private blockchain networks provide data authorization and selective access to pre-approved parties. Private blockchains are also providing an interim solution with privacy features for businesses until the public blockchains start to implement the same.

The blockchain technology is widely used in the energy market for various applications such as grid management, energy trading, government risk and compliances management, payment scheme, supply chain management, and

others for reducing disputes, lowering risks of fraud in delivery, ensuring payment certainty, offering transparency in trade asset movement, and providing improved flow of trade receivables. The energy trading segment accounted for the largest share of 47.2% in 2017 and is projected to reach \$3,692.1 million by 2023, at a Compound Annual Growth Rate (CAGR) of 81.62%.

Major Benefits of Blockchain in the Energy Sector

- Shorter settlement cycles with efficient back-office processes
- Better data standardization and streamlined regulatory reporting
- Monetization of new blockchain platforms and creating new business models
- Cost reduction & environmental sustainability
- More focus on transparency of Energy stakeholders without affecting the privacy of the data
- Removal of expensive market frictions and intermediaries
- Improved visibility, collaboration and operating efficiency made possible by blockchain's transparency

Market Overview

The global blockchain in energy market is projected to reach a market size of \$7,110.1 million by 2023, at a CAGR of 78.32%, from an estimated \$394.3 million in 2018. This growth can be attributed to the increasing need to manage the infrastructure, rising global security concerns, ensuring transparent and efficient transactions, increasing innovation in trade and supply chain management, and the growing number of blockchain start-ups across various industry verticals.

According to an estimate, Europe is predicted to be the largest market for blockchain in energy

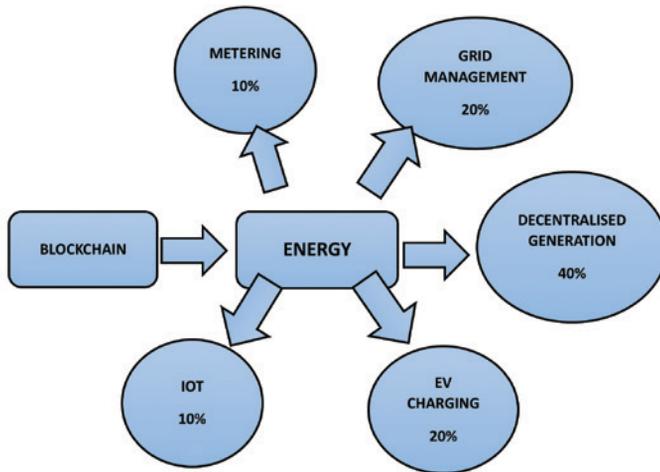


from 2018 to 2023. In the process of achieving secure and accurate data to the customer, countries such as Germany, the U.K. and the Netherlands are investing in adopting blockchain technologies to solve instances of fraudulent activities across transactions between multiple stakeholders at a global level.

The US Federal Trade Commission has created a Blockchain Working Group to standardize the regulatory standards on the way transactions need to be written that will help in formalizing the regulations and addressing the uncertainties in the adoption of blockchain in the energy sector.

New product launches, partnerships, investments and expansions are some of the significant strategies adopted by the leading players like Microsoft, Accenture, IBM, Infosys and SAP in the blockchain energy market.

Emerging Blockchain Use Cases In Energy



• Decentralized Generation

Advanced communication and data exchanges between different parts of the power network are, to an increasing extent, required — making central management and operation more and more challenging. Local distributed control and management techniques are needed to accommodate these decentralization and digitalization trends. Blockchains or distributed ledger technologies (DLT) were primarily designed to facilitate distributed transactions by removing central management resulting in addressing the challenges due to the decentralised energy systems.

• Metering

Renewable energy credits (REC), which are issued by the respective government authorities to the renewable power producers, help them in distinguishing themselves from the traditional fossil fuel power suppliers. Blockchain in energy is helping in removing the duplicity of the counting of RECs when multiple stakeholders claim the credit for the RECs, thereby eliminating the inefficiencies in the issuance and verification process of RECs.

• Grid Management

PONTON has developed an initiative of Grid chain, an innovative pilot software based on blockchain technology that simulates future processes for real-time grid management.

• IoT

Filament provides blockchain IoT solutions such as smart metering, real-time monitoring, asset tracking, and asset management and has raised \$6 million to allow electronic devices to be connected online in blockchain platforms. Filament enables smart devices to blockchain transactions that can integrate into different distributed ledger architectures by using their Blockchain solution.

• EV Charging

Blockchain solutions aim to provide incentives for privately developed EV charging infrastructure. With blockchain-enabled solutions, EV owners can gain greater transparency in energy charges and can potentially have a greater choice in selecting their energy supply solutions. Also, with the integration of blockchain technology with metering infrastructure, blockchains deliver automated billing in energy services for consumers and distributed generators, which helps in administrative cost reduction and faster billing cycles.

**BLOCKCHAIN
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AND TRANSFORM
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AND SERVICES
BY PROVIDING
TRANSPARENCY
AND IMMUTABILITY**



About the author: Praveen Jujjuvarapu is currently working as an Assistant Manager, Advisory in Energy and Power domain in MarketsandMarkets Research Pvt Ltd. He has a total of 7.5 years of work experience in the areas of operations and commissioning, supply chain management, advisory consulting, pre-sales and process excellence strategy.

For more information, visit: <https://www.marketsandmarkets.com/>



Meet the Demand to Improve Liquidity with Seamless Invoicing

By: Dinesh Vaz, Operating System Product Owner, Schlumberger

If you were to pick the singular, culture-defining moment that transformed the business environment in the decades bracketing the turn of the millennium, you would have to choose technology for the many ways it streamlined operational processes. Two decades later, we are again at the threshold of seismic shifts in process management, as evolving robotic process automation (RPA) tools that help organizations create value are changing how global businesses operate in energy and other sectors.

In my 25 years working in the oilfield services industry, I have witnessed the adaptation of new technology systems, from mainframe architecture to today's emerging and nimble value creation technologies. While information technology (IT) solutions of the early 90s drove efficiency to the end-user at the transaction level, today's IT strategies are being designed to meet the increasing demand for process efficiency and value creation. Throughout energy, manufacturing, and other industries, we see that the stakeholders' mindset has changed, driving objectives for process optimization and early value creation.

These new tools enable enterprise teams to align software and processes to maximize organizational value. But even the best tools are still only tools — they depend upon human buy-in to work effectively. With acceptance and collaboration, new RPA systems can enable us to design a path in which the contracts management, service delivery and billing teams can work together to improve efficiency and help any company get paid faster.

Invoicing matters

A company's liquidity is a key factor driving financial growth and future investments. One of the easiest ways to improve liquidity and increase free cash flow is to submit accurate invoices to your customers early in your revenue cycle process.

For any business, the key takeaways in terms of invoice submission are timing and ac-

curacy. In a cost-saving environment such as the energy industry, where market pressures necessitate even more stringent operations, the procurement side of oil and gas companies demands that every invoice be audited prior to payment. Because invoice auditing by the customer delays approval and settlement, creating a long cycle in which cash flow is hindered, oilfield services companies must ensure that they are sending accurate invoices promptly in order to maintain their own liquidity.

David Yager sums up the problem in his article, "The Broken Payment Model that Costs the Oil Industry Millions." Regarding the invoice, Yager says: "Once it has been exhaustively reviewed to ensure every i is dotted and t is crossed (it has to be perfect to ensure final payment), the invoice is sent to the client's head office." But all that i-dotting and t-crossing takes time, and time is money. How much money?

"Invoicing delays kill your cash flow," says one developer of oilfield services enterprise resource planning software. "For example, invoicing just 10 days faster results in a \$273,972 increase in cash flow for every \$10,000,000 in annual sales."

In most oilfield service companies, the fundamental causes of invoicing delays can be found within the organization, and the root cause can often be attributed to a lack of departmental collaboration and IT solutions that enable faster invoicing. This is exacerbated when invoicing processes are centralized or outsourced. Most of the delays could have been easily avoided by simply following the customers' billing requirements.

Using process alignment and digital solutions to improve the invoicing submission rate

The path to speeding up invoice submission requires alignment among personnel and systems in contracts management, service delivery and billing. The following steps, in conjunction with a well-designed IT solution, will guide a process that reduces errors and accelerates cash flow.

Step 1: Contractual terms should include billing requirements.

The more people involved in setting the deal, the bigger the chance that this information gets lost. Sales representatives are often the people who receive the billing instructions, but as they direct their focus to securing new leads, they may neglect the formalities that come after winning a client or project. Tighten your process with these steps:

- Include specifications and written agreements about the billing requirements in the account management/contract lifecycle process.
- Your customer/contract management IT solution should facilitate the governance and capture of billing requirements: this data forms the digital repository of billing requirements, which specifies the operational data, supporting documents and invoice format agreed upon for submission as part of the billing process.
- Improve contract data visibility: leverage your contract data for insight into projected billings, projected revenue, billing and contract renewal status; and store and manage all information about customer agreements in a single location.

Step 2: Operations should be responsible for accurate invoicing.

The primary focus of the operations department is on service/product delivery, yet this is where most of the billing requirements in the form of documentation and data will be collected. Because of their operational focus, field engineers often fail to capture essential information, including the correct customer name, bill-to address, lease/well number, AFE/PO number, contact number, and/or the name of the company representative. Missing billing information slows down the invoice process or can even lead to disputed invoices, which further delay invoice approval and payment. You can prevent these problems in the following ways:

- The standard work instructions (SWI) for operations should include the collection of supporting documents and the capture of data to support billing requirements.
- Your Field Ticketing IT solution should integrate with the digital repository (accounts/ contracts IT solution) of billing requirements and build validation to ensure that documents and data to support invoicing are collected on time.
- To eliminate human error, design and require the use of standard forms to capture information at the well site.

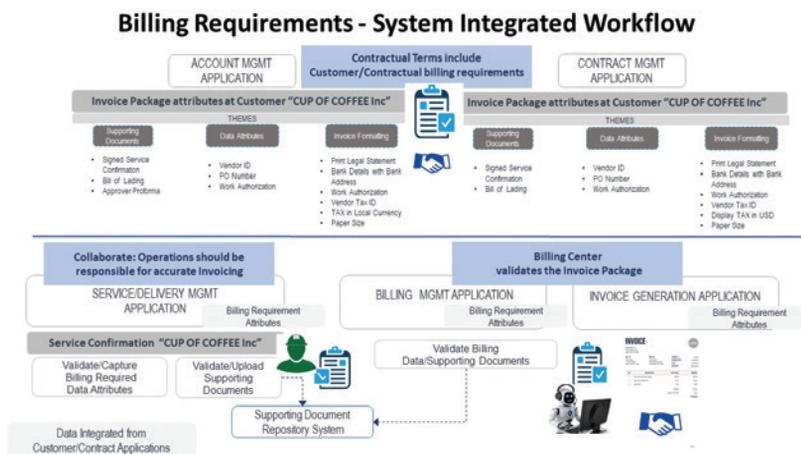
Step 3: The billing team validates the invoice package.

Billing teams must be aware of all required documents and data before an invoice is submitted, and this checklist should be maintained in digital form. However, each item on the checklist needs to be manually validated, which — because it is prone to human error — can cause delays in generating and submitting the invoice. You can minimize errors and delays and better protect your data by:

- Defining a responsibility assignment matrix (RACI: Responsible, Accountable, Consulted, Informed) to manage the E2E (end to end) process, so that the billing team knows who is internally responsible for changes to the billing requirements and who is collecting the documents and data.
- Implementing system-enforced business rules to validate your invoice package before submission.
- Integrating invoice output generation software with the digital repository (accounts/ contracts IT solution) of billing requirements to ensure invoice formats are compliant with local regulations.
- Using RPA tools to automate some of the manual repetitive validations.
- Adopting eCommerce standards as recommended by OFS Portal®, a member-based advocacy community comprised of upstream oilfield service companies and oil and gas companies to promote data security in the oil and gas sector. OFS Portal champions the use of Petroleum Industry Data Exchange (PIDX International) standards in upstream eCommerce exchanges such as billing.

An integrated IT solution

This illustration of a system-integrated workflow depicts an IT solution that enables collaboration between the departmental teams, to ensure clarity, compilation, and validation of the billing requirements.



Step 4: Monitor, measure, improve.

Currently, although we spend days looking at invoice issues, there is no collaborative way to review what is going well and what is not. The process outlined in the illustration above provides a way to implement solutions and then track and measure them to gauge whether they are working and determine how we can do better. For example:

- If we identify various billing requirements for the same customer, perhaps they could be negotiated with the customer to create uniform requirements that simplify the process.
- We can identify which key elements of the invoice package take longer to generate and collect.
- We can measure the effectiveness of our collaboration with various stakeholders, including teams in sales, operations, and the billing center to determine who is causing the delay and how it can be improved, and then take steps to develop and implement training and change management.

Value Creations

The time you invest in focusing on process alignment and implementing an agile IT solution will yield significant financial results over time. As this graph shows, a collaborative process combined with an RPA solution decreased the number of days it took to generate an invoice, thereby producing a significant improvement in the invoice submission rate after the IT solution was implemented.

Integrating contract management solutions with service ticket solutions ensures the timely collection of documents and data, and RPA tools eliminate human error in validating the final invoice. Today's robust customer portal tools also make it possible to implement additional E2E billing integration with oilfield services companies, for a seamless solution that will have a positive impact on the bottom line.



About the author: Dinesh Vaz specializes in information technology process management, with 25 years of expertise in the design, creation, testing, training, and cross-departmental implementation of transformative business system applications for the oil and gas industry. As an Operating System Process Owner at Schlumberger, Mr. Vaz is an Advance Scoping Champion on an elite team empowered to work with the oilfield services company's global business units preparing for SAP deployment, and responsible for overseeing the worldwide launch of new digital tools and systems.

POWER IN MANUFACTURING



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Large Investment Will Change Lives in Developing Nations

Special to SHALE

Three billion dollars will make a radical difference in the lives of people in developing nations needing electricity. Ventana Tek (VentanaTek.Com), an American company, finalized a major agreement with Nigeria. The green energy company will provide badly needed electricity with high-efficiency vertical wind turbines, natural gas/propane engines, and water wheel generators.

Ventana Tek is licensed to build The Franklin-Thomas Company's (FTC) high efficiency, zero cogging, permanent magnet generators, fitting the entire line of renewable energy systems. FTC, also an American company, is in Central Florida. Providing several methods to drive the independently-proven generators, Nigeria will always have the best choices to tackle energy needs. FTC's generators are not like the common wire-wound alternators on standby generators.

The United States Embassy joined negotiations to ensure funding was available and secure. The embassy is interested in expanding this electrical power to other African countries. Further, the manufacturing of both the wind turbine and the electric generators will soon be done by local people in Africa, creating many jobs. This was the central goal of the U.S. Embassy.

Joe Shepard, CEO of FTC and inventor of the zero-cogging generator said the generator took 12 years to perfect and has been proven the best in the world. Zero cogging means the neodymium magnets in the rotor, the part that spins, do not magnetically attach to the fixed stator. Shepard had the generator independently tested at 92.3% efficiency by the world-famous Advanced Energy in Raleigh, NC. This generator is the key and essential part of the entire Nigerian effort.

Ventana Tek tested over \$500,000 of different generators from all over the world. They decided the FTC generator was the one that met their needs. To make sure the FTC generator would hold up to rigorous demands, Ventana Tek ran the generator for 250 hours. The generator held up. More importantly, the generator showed it could produce power for between 3 and 5 cents per kilowatt-hour.

Ventana Tek negotiated a licensing agreement with FTC to build the generators. The FTC engineers helped get the manufacturing underway. Ventana Tek quickly proved they were determined to create the best generator possible and did just that. The U.S. Embassy made sure the generators were thoroughly vetted before attaching their name to the project.

FTC's Shepard said, "Powering a refrigerator in a Nigerian village can radically change the lives of individuals. Our off-grid renewable electricity can radically change a nation such as Nigeria." Ventana Tek and FTC have a bright future with contracts for turbines and generators from many others. Ventana Tek has orders for thousands a month including the U.S. Army and other customers.

A YouTube video of a generator can be found at <https://www.youtube.com/watch?v=LNkUwN5NLMQ=>



The manufacturing of both the wind turbine and the electric generators will soon be done by local people in Africa, creating many jobs

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IT'S THE HARD-KNOCK LIFE FOR TECHNOLOGY IN OIL AND GAS

By: David Plourde, Dell Rugged

DELL RECENTLY RANKED OIL AND GAS PRODUCTION AMONG THE TOP 20 MOST RUGGED JOBS IN AMERICA. THE LIST EVALUATED THE PHYSICAL LABOR, RISK OF FATALITY AND INJURY, AND ENVIRONMENTAL EXPOSURE THAT WORKERS ENCOUNTER DAILY. THESE CONDITIONS PUSH MENTAL AND PHYSICAL LIMITS, BUT A CONTEXT THAT IS OFTEN OVERLOOKED IS THE TOLL INFLICTED ON WORK EQUIPMENT, AND HOW THAT TOO CAN NEGATIVELY AFFECT WORKERS.

Laptops and tablets brought office computing power on the go, revolutionizing location-based work. They have become the go-to device for oil and gas workers where a significant chunk of time is spent in the field. However, due to the extreme conditions of the work itself, special considerations in IT equipment must be made.

Even in an ideal scenario, a typical commercial laptop can only take so many bumps and dings. Out in the field, working on uneven, rocky ground or out in the open water, the extreme conditions can easily break a machine with little effort. Those assets, if broken, can cost your organization in both production and safety. If a worker's laptop fails in the field, it could slow or even halt production on the project they are working on as well as cause significant safety risks if they are not able to communicate with their crews at a critical point. The U.S. Bureau of Labor Statistics reported that workers in the oil and gas business are among the highest at risk for injuries and fatalities on the job. Dependable, reliable equipment can make a safety difference.

This labor-intensive work requires specialized IT equipment. Rugged IT client devices are designed with this in mind, to withstand the harsh

conditions and challenges the oil and gas industry brings to bear.

Defining Durability in the Field

What is meant when we use the term "rugged" when referring to an IT client device? A rugged client device is a purpose-built machine which can be either a laptop, a tablet, or a 2-in-1 convertible which can switch between the two. True rugged devices will meet the United States military's MIL-STD-810G standard for drop and impact resistance. This can be accomplished by employing a hardened shell of impact-resistant ultra-polymers and sturdy magnesium alloy to frame the exterior. Early rugged systems saw a drawback to these requirements due to additional weight, but new advancements with lighter materials have significantly cut down on the bulk and weight with some 12" fully-rugged tablets weighing under 3 pounds. But to be rugged you must also safeguard critical internal components and, in some cases, advances like HZO® Protection can be applied to keep the machine's internals safe from exposure to liquid.

Perhaps the most critical safety aspect of the oil and gas industry is the constant risk and dan-



LABOR-INTENSIVE WORK REQUIRES SPECIALIZED IT EQUIPMENT

ger associated with the presence of flammable gases in the air. If improperly selected, an electronic device could easily serve as an ignition source for those gases with disastrous results. Companies operating in such environments would do well to ensure the safety of their personnel and their assets by utilizing rugged client devices carrying ATEX and IECEx certifications, validating that they've been tested for, and are safe for, use in potentially explosive workplaces.

Testing for Durability

Though these devices are considered “rugged” they are not indestructible and even the most rugged device will still have its breaking point. This is most evident when it comes to unpredictable and inherently harsh working environments. The goal for a rugged PC manufacturer is to keep moving that breaking point further away from the end-user. At Dell, we have created an extreme testing facility to push the physical limits of our rugged products to create tougher, better devices. Within the **Dell Latitude Rugged Lab**, you will find specialized machines designed to simulate those inherently harsh working conditions with trained engineers subjecting our devices to the following sample of endurance tests:

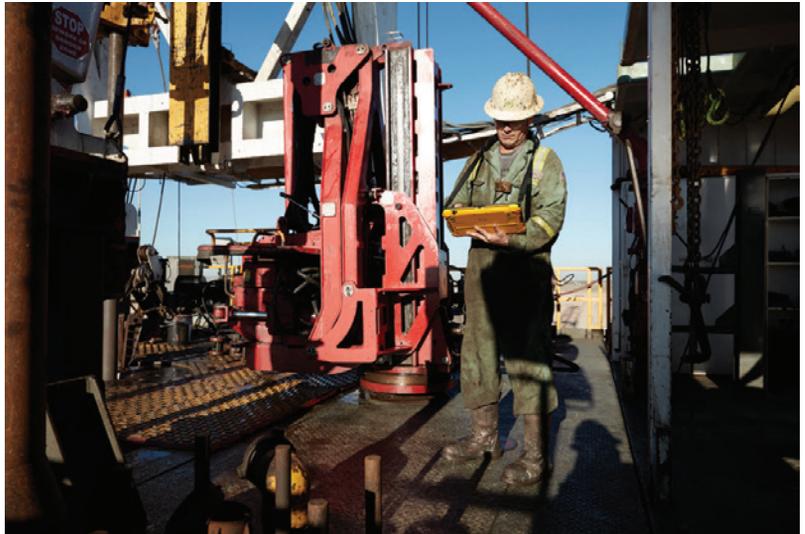
- **Extreme Cold:** A freezer chamber that can drop the temperature to -60 degrees Fahrenheit.
- **Extreme Heat:** A heat chamber that can bring the temperature up to 160 degrees Fahrenheit.
- **Water Ingress:** A water chamber simulating 70mph driving rain.
- **Dust Ingress:** A dust chamber which circulates fine particulate and encases the system in dust.
- **Hinge Durability:** A hinger cyler that opens and closes a laptop/tablet lid 150,000 times.
- **Drop Test:** Systems free fall between 3 to 6 feet at multiple angles.
- **Salt Fog:** A chamber designed to test salt fog/air/mist.

When we test – we test to fail. By pushing our systems to their physical limits, we can ensure our system’s reliability in extreme environments and utilize that data to improve upon our existing designs and future product releases.

Engineering for Functionality

Beyond durability, there are other practical aspects that IT buyers in oil and gas must consider. Industrial gloves can make device interactivity a challenge and working under direct sunlight can cause glare on the screen. The rugged devices Dell brings to the market go through a thorough research and development process to identify user pain points, so we can build solutions for them right into the machine.

In the case of our latest Dell Latitude 7220EX Rugged Extreme Tablet, we’ve added a 1000-nit Corning Gorilla Glass screen for maximum visibility in direct sunlight, along with glove-touch capacity and ATEX and IECEx certification for use in potentially explosive environments. Dual, hot-swappable batteries will keep your workers productive all day without having to interrupt the job to get a fresh charge. New 802.11ax wi-fi connectivity offers reduced interference and increased network throughput for faster video streaming and file transfers. Lastly, a dispersed workforce spread across multiple locations can make it difficult for an IT manager to



ensure every machine is up to date and working properly. In response, Dell created a set of unique tools called the Dell Client Command Suite with VMware Workspace ONE. This unified workspace solution provides IT departments a central control point to remotely push critical updates, firmware and new applications to all deployed devices regardless of where they are in the field.

Taking all these aspects into consideration, a rugged device delivers long-term value by extending the life of the machine and enhancing employee performance. Since all workplaces are unique, recognizing your use case will help identify the correct rugged device with the right mix of capabilities. The safety of your workers and the success of your business can start with the performance of your devices on the front line.



About the author: David Plourde leads strategic alliances for the Dell Rugged business, working closely with Dell customers and technology partners. He’s spent over a decade in the Rugged computer industry and has more than 25 years’ experience in both the commercial sector and state & federal government sales.

NEW BATTERY TECHNOLOGY FROM NATIONAL KOREA MARITIME & OCEAN UNIVERSITY

Special to SHALE

The existing method for adding metals to organic materials is dangerous and laborious. Scientists from National Korea Maritime & Ocean University have now developed a new method that is simple, safe and cost-effective. This method, in addition to enabling a host of possibilities, such as ferrofluids, will allow the production of sodium-ion batteries, an improved alternative to lithium-ion batteries.

Carbon-containing molecules can be engineered into a variety of forms and structures, making them exhibit remarkable properties, including high mechanical strength, good thermal and electrical conductivity, and chemical stability. This is why they have a wide range of applications across multiple fields, such as energy production, environmental engineering, and electronics.

Many important characteristics of carbon-based materials can be tuned and new functionalities unlocked through metal doping, which essentially means adding very small metallic particles to the carbon structure. In many applications, doping carbon-based materials with metallic particles of diameters smaller than 100 nanometers leads to better performance. But the existing methods to create such small metallic particles are unsafe because of the use of dangerous gases, such as silane gas.

Fortunately, a research group from the National Korea Maritime and Ocean University has developed a novel and safe method for the production of metal-doped carbon-based composites (referred to as MADOC-carbon composites). In this method, first a metallic ingredient is added to an organic solvent (a liquid containing the carbon-based material). Then, a pair of metal wires are introduced to the mixture and direct current is applied to them. This produces what is known as plasma discharge, which are powerful glows or sparks of electrons.

The energy transmitted from the plasma discharge to the molecules in the mixture causes them to break apart into “radicals,” which quickly recombine to form the desired composite material, where the metal is mixed with the carbon.

This new method has many advantages. A variety of metallic and organic ingredients can be used, allowing for the production of many different composites. In addition, these MADOC-carbon composites have many useful characteristics. “Doping metal atoms into a carbon support through plasma discharges enables metal atoms to stably maintain high performance without undergoing degradation for a prolonged period of time,” explains Professor Jun Kang, who leads the research group. Another key advantage of this method is that it is safer than currently available procedures, which use dangerous gaseous materials. Also, this procedure can be used to consistently obtain very small metallic particles. “Due to the structural characteristics attained through the proposed method, it is possible to synthesize composites doped with ultrafine metal atoms,” remarks Kang.

Some of the most relevant applications of MADOC-carbon composites are sodium-ion batteries, ferrofluids, and lithium-ion batteries. These types of batteries have found uses in multiple fields, including portable consumer electronics, sensors, and industrial equipment. Specifically, sodium-ion batteries, which can be an improved and effective replacement to lithium-ion batteries, can only be possible with safely and cost-effectively produced carbon composites. Because the proposed method can be carried out at room temperature, not only the risks, but also the cost of producing ultrafine metal particles can be greatly reduced. This technique will facilitate the production of a wide variety of materials, which could unlock myriad novel functionalities and applications.

MANY IMPORTANT CHARACTERISTICS OF CARBON-BASED MATERIALS CAN BE TUNED AND NEW FUNCTIONALITIES UNLOCKED THROUGH METAL DOPING, WHICH ESSENTIALLY MEANS ADDING VERY SMALL METALLIC PARTICLES TO THE CARBON STRUCTURE



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WEN SOUTH TEXAS HOSTS: FROM THE WELLHEAD TO THE WATER

More than 75 people attended the Feb. 27 luncheon featuring Sean Strawbridge, CEO, Port Corpus Christi, and he had a lot to say.

As the keynote speaker of the event, Sean Strawbridge mentioned the upcoming elections and the concern over the energy stock markets, but also acknowledged that now is the time to act.

“To improve the image of energy, we as an industry should improve on our messaging, including focusing on environmental and social management.” He later added, “We should also hire more women because diversity offers perspectives for success.”

Strawbridge's address was followed by a panel discussion that included David Blackmon, Editor, SHALE Magazine; Kris Jensen, VP Project Engineering, NuStar Energy; and Jeff Dorrow, VP Commercial NGL & Crude, EPIC Midstream. Kym Bolado, CEO, SHALE Magazine, served as the moderator.

This successful event was made possible by many event sponsors. The title sponsor of this event was NuStar with supporting sponsors: Badger CPA, EPIC Midstream, Port Corpus Christi, and Valero. A big thank you goes out to them.



PHOTOS COURTESY OF SHALE

TEAC HOSTS AN ADVOCACY MIXER IN HOUSTON

Texas Energy Advocates Coalition (TEAC) hosted an energy advocacy mixer on Feb. 20 at Fogo de Chao in Houston to touch on the importance of coming together as energy advocates and spreading awareness on the impact of the energy sector on our community and economy. Sponsors, Port Corpus Christi and Aggreko, took the mic to share their views on the role we can play as energy advocates.

To learn more about TEAC, visit txenergyadvocates.org.



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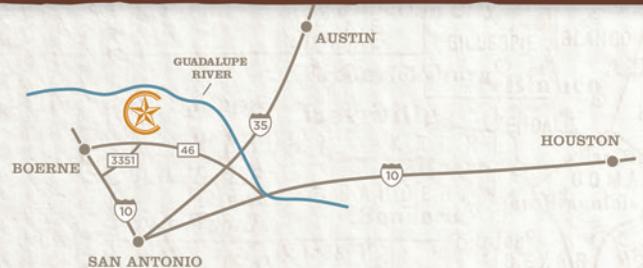
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