KTSM 9 News

Fracking makes the Texas oil and gas industry possible; it may also be harming the state

Caden Keenan 1 month ago

AMARILLO, Texas (KAMR/KCIT) – Texas leads the United States in oil and gas production, including producing 43% of the nation's crude oil and 27% of its natural gas in 2023. Yet its cornerstone industry could be straining the state's long-term health through increasing water use, waste and contamination.

The Lone Star State has been a major player in the nation's oil and gas industry since the Lucas No. 1 well in Spindletop first blew in 1901, a dominance that has continued into the 21st century. But in recent decades, gushing oil has become less common at an average wellsite than water

Much of Texas' recent oil and gas production boom has been because of a growing use of hydraulic fracturing. But that growth has heightened concerns over its environmental and economic costs.

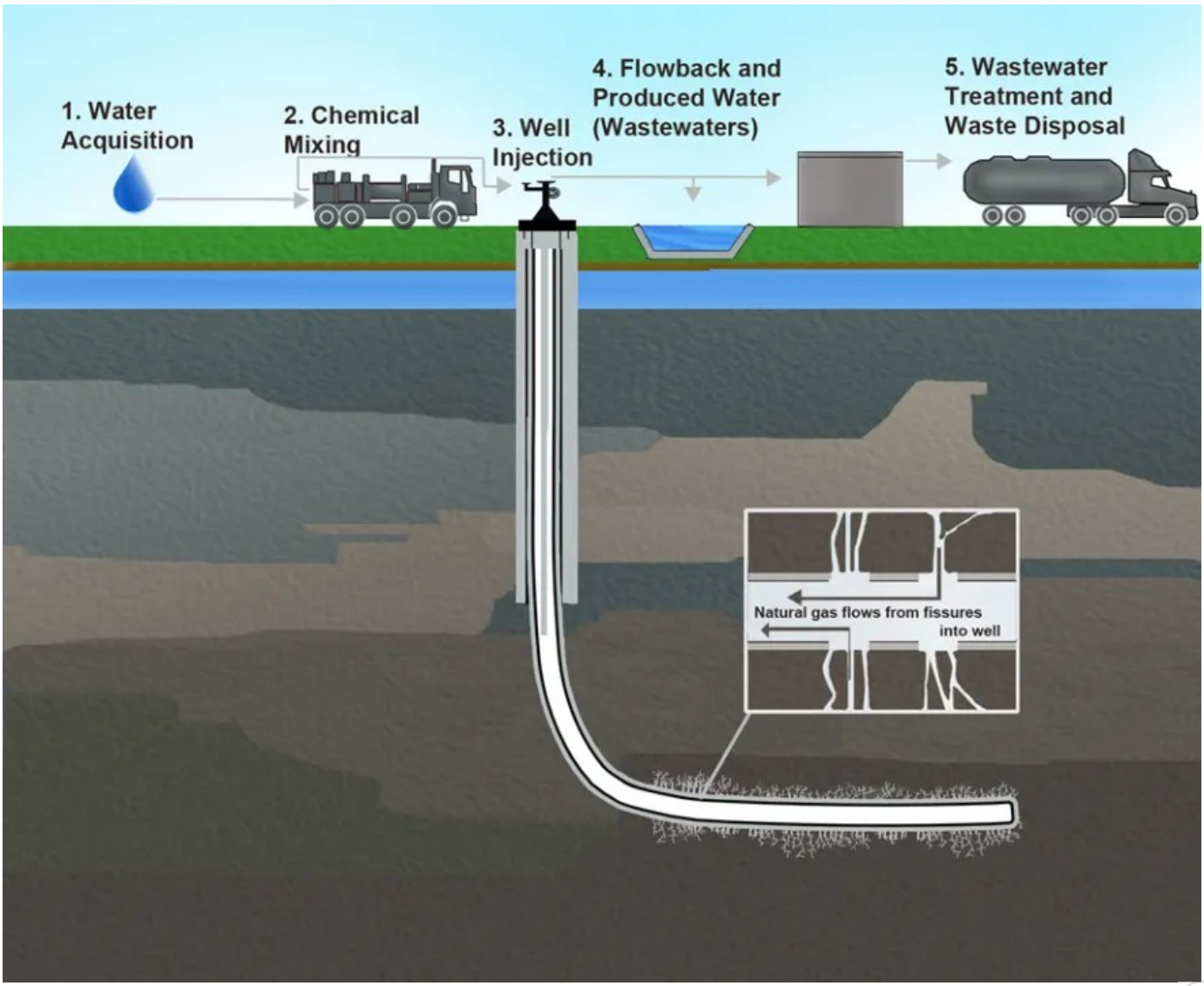
What is hydraulic fracturing?

"Fracking" is a common name for hydraulic fracturing, which is a process that uses a high-pressure mix of water, chemicals and sand. During the process, a solution of pressurized water, chemicals and proppants such as sand are used to create and hold apart fractures in the rock, allowing oil and natural gas to flow through pipes for collection.

Most fracking happens in horizontal wells, which extend deep into rock formations before turning sideways to cover more surface area. Once the piping is in place, the high-pressure mixture fractures the rock and a proppant like "frac sand" – a uniformly-shaped sand that can resist being crushed – holds the fracture open to make space for oil and natural gas to flow.

After fracking, wastewater called “flowback fluids” returns to the surface and is often injected into underground disposal wells (sometimes after being taken to another site), treated and discharged, or recycled.

Oil and gas extraction generally also brings “produced water” to the surface as a byproduct, which is often treated the same way.



Fracking can be dated back to the 1860s but became dominant in US oil and gas production in the 2000s. Horizontal drilling and fracking as a combined technique grew in popularity in part because it was shown to increase the production potential of oil and gas wells by making it possible to access reserves in tighter rock and shale formations, as explained by the Texas A&M AgriLife Extension Service.

Why? Surface area. Well sites with horizontal wells are able to make contact with more surface area of a rock formation compared to vertical well systems, which has also added to the production potential of the horizontal fracking wells, according to the US Energy Information Administration and notes from the Journal of Petroleum Technology.

Texas workers face mounting dangers in the heart of America's greatest oil boom

Much of Texas's on-shore oil and gas production occurs west of the 100th meridian, but is otherwise focused on five major shale plays and tight rock formations.

Texas's oil and gas industry, and its fracking use, centers on five major formations:

- Granite Wash Field (Texas Panhandle);
- Permian Basin (High Plains, South Plains and West Texas);
- Barnett Shale (North Texas);
- Haynesville Shale (East Texas); and
- Eagle Ford Shale (Central and South Texas).

Researchers have long noted that low-permeability formations like those in the Texas Panhandle require hydraulic fracturing to produce oil and gas at economic rates. As in other shale plays of the state, hydraulic fracturing is needed to get profitable amounts of oil and gas out, according to researchers such as Tucker Hentz with the Bureau of Economic Geology.

> "Because of their typically low permeability, the Cleveland sandstones require acidizing and hydraulic fracture treatment to produce gas at economic rates."
>
> *Tucker Hentz, 1991*

Though Texas led US petroleum production from 1960, its output declined after 1972. The state has two-fifths of the US's crude oil proved reserves, but much of the remaining oil and gas are within the shale plays and tighter rock formations, leading many producers to consider fracking and horizontal wells essential for continued production.

Fracking isn't limited to shale plays, coalbeds and tight sands – more than 95% of US wells are fracked at some point, including those in looser rock formations.

This means that while regions with shale and tight rock may see the most concentrated fracking activity and obvious consequences, its impacts are felt in every wellfield across the country.

The business costs and function of fracking

Fracking can increase well production but comes at a high cost. Its rise in the early 2000s was

In 2003, Texas made permanent a severance tax rebate originally designed as a temporary way to incentivize companies to spend money pursuing deeper or more difficult-to-reach reserves, such as those that might require expensive production strategies like fracking or building horizontal wells.

As of 2025, the tax rebate applies to wells that are deeper than 15,000 feet and aren't expected to produce more than five barrels of crude oil per day without "stimulation" such as fracking. However, some wells and some types of production (condensate or casinghead gas) do not qualify for the rebate.

Other severance tax incentives available as of 2025 in Texas include:

- Enhanced Oil Recovery Incentive: Covers oil produced from a new enhanced recovery project or expanding existing project;
- Enhanced Oil Recovery Using Anthropogenic CO_2 Incentive: Covers enhanced oil recovery projects that inject gases like carbon dioxide into a well as part of the fracking process;
- High-Cost Gas Incentive: Reduces severance taxes for "high-cost gas wells" according to drilling and completion costs;
- Incentive to Market Previously Flared or Vented Casinghead Gas: For operators who market casinghead gas that had previously been released into the air for at least 12 months;
- Two-Year Inactive Well Incentive: A five-year severance tax exemption for hydrocarbons from a "two-year inactive well," which has not produced oil or gas in more than one month in the previous two years;
- Severance Tax Relief For Marginal Wells: An incentive for producers of "marginally" producin

- Enhanced Efficiency Equipment Severance Tax Credit: Available for marginal wells for using equipment that reduces the energy required to produce a barrel of fluid by 10% compared to other equipment; and
- Incentive for Reuse/Recycling of Hydraulic Fracturing Water: Amends the Texas Tax Code to exempt taxes on items used to process, reuse or recycle wastewater that will be used in hydraulic fracturing work on an oil or gas well.

In 2005, Congress exempted fracking from federal regulation under the Safe Water Drinking Act. While the SWDA's Underground Injection Control program sets some limited requirements for well siting and construction, it did not cover fracking or its potential impacts.

Even though the EPA revised guidance for fracking in 2014 and developed the "UIC Class II" permitting guidance for fracked wells, that revision only includes fracking that uses diesel fuels as part of the fluid.

A 2017 memo from the EPA Office of Water said that the industry largely moved away from using diesel fuels in the fracking process to avoid stricter permitting. This means that the majority of fracking performed in the US is not regulated by the agency.

Altogether the state and federal policies adopted up until 2025 have tended to allow for oil and gas production with a potentially lower level of cost or oversight, particularly in areas such as Texas with particularly high potential supplies.

Despite tax breaks and regulatory gaps, fracking is still no guarantee of success. Members of the

operators to shoulder the high costs of horizontal drilling and fracking without state or federal aid. That can add stress to smaller producers and service companies that larger corporations may be able to avoid.

The Institute for Energy Economics and Financial Analysis has echoed this challenge. Further, fracking can lock companies into spending more to make increasingly little.

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"In short, higher production per well doesn't necessarily mean more profitable wells; sometimes it just means longer, more expensive wells…" said one IEEFA report from 2021, concluding, "… Most fracking-focused companies have never been able to simultaneously boost production and produce robust cash flows."

For smaller, family-owned producers and service companies in the Texas Panhandle, the cost-benefit equation of fracking can be a business-breaking gamble. With oil prices volatile and production booming elsewhere, like in the Permian Basin, many have no choice but to pursue enhanced or unconventional recovery methods – but even that may not be enough to keep them afloat.

Control and conflicts

Survival for small oil and gas producers means balancing market pressures, regulatory uncertainty, and rising costs.

Exploration also said the built-in stress of the market has rippled out into worry about added pressures from potential industry regulations. New rules could make operations in their area uneconomical – or outright illegal.

“The concept of them may be good-intended,” said Buckles, “but it’s going to take a big impact on small operators, and basically makes a lot of their operations now illegal when it’s been the way that we’ve been doing business for the last 100 years. So things like that are very difficult to face.”

“The big companies can roll with that, because they’re constantly changing,” Buckles continued, “But when you take a small company, a small producer that has a handful of employees, and now you make their product or their projects uneconomic or simply illegal to produce. Now you’re affecting employees and people’s payroll, and that goes into other things where you start, you have trickle-down economics in small communities. And so that’s the hardest part about all of that.”

These economic pressures have left producers wary of reforms, even those aimed at reducing waste or improving safety – things they’ve expressed interest in as stewards of their legacies and communities. That internal conflict appears in their interactions with the wider world too, as oil and gas producers face criticisms about the environmental and health impacts their operations can leave behind when something goes wrong.

Oil and gas producers also face outside scrutiny over fracking’s environmental and health impacts. Critics have pushed for data collection and more oversight on water use and

Lacking fracking regulations

Fracking operates in a regulatory gray area, exempt from key federal oversight and loosely governed by state agencies. In addition to the federal deregulation, Texas also gives the industry a long leash.

In 2005, Congress excluded fracking from the Safe Water Drinking Act, removing federal safeguards for underground water sources. The EPA later introduced regulations in 2014, but they only applied to fracking with diesel fuel; a practice abandoned by most companies to avoid tighter regulations, leaving the majority of US fracking unregulated under the UIC program.

This regulatory blind spot comes even as recent studies, such as one from Southern Methodist University, have linked fracking and wastewater injection wells to widespread groundwater contamination and blowouts – including in previously-plugged wells that could be miles away from an injection site.

In Texas, regulation for oil and gas production is the domain of the Railroad Commission.

The RRC requires a minimum annual inspection for commercial disposal wells, which take produced water from operators for a fee, and that every saltwater disposal well is required to undergo integrity tests at least once every five years. However, the RRC doesn't perform regularly scheduled inspections on the wells it permits; an oil and gas producer that operates its own disposal and injection wells does not have scheduled regular inspections.

Talks of power line fire safety, local action continue after 2024 Texas Panhandle wildfires ›

Even when inspections happen, enforcement is weak. The RRC inspectors do not have the equipment to fully inspect sites when needed for things like emissions and leaks, and do not have the power to issue enforcement actions and penalties at the time of inspections.

Meanwhile, the RRC has said it has no authority to regulate water withdrawals for fracking, deferring instead to local groundwater districts – many of which in turn tend to refer back to the RRC.

As previously reported on MyHighPlains.com, state law in Texas also allows oil and gas producers to indefinitely keep even low-producing "marginal" or "stripper" wells, and inactive

plugging a well site.

Even then, many organizations technically out of compliance with the regulations that do exist are still granted permits and extensions, and state intervention to begin properly shutting down and cleaning up a site often takes years.

Water and waste

Prompting the use of "hydraulic fracturing" as its name, fracking as a strategy for collecting oil and gas requires using vast amounts of water.

While the US Geological Survey has said there isn't a "typical" amount of water used per fracked well, as that depends on a number of individual well factors, in 2012 the average ranged from 1.5 million gallons to upwards of 16 million gallons of water per well.

As fracking technology has evolved and the strategy has become more commonly adopted, the amount of water used per well has increased dramatically.

A 2018 study from Duke University said that particularly in the Permian Basin, water use per well increased by 770% from 2011 to 2016. With around 95% of wells in the US currently expected to be fracked in their lifetimes, per the Colorado Oil & Gas Association, the increased popularity of the practice and the rising amounts of water used can become a stressor to regional water sources.

West of the 100th meridian, communities in Texas increasingly rely on groundwater sources. Particularly in the Texas Panhandle and West Texas, aquifer systems are often the predominant source of water for municipal, agricultural and industrial uses – including the major Ogallala, Edwards-Trinity and Pecos Valley systems.

The overuse of groundwater sources in Texas has contributed to a statewide water crisis that lawmakers warn could have heavy consequences for economics, agriculture and community life within the next 50 years. Water-intensive practices and development run the risk of depleting the major water sources of the region even more quickly.

Groundwater use in Texas is monitored and regulated on a local level by organizations such as Groundwater Conservation Districts enforcing area rules with the intent to conserve and protect

and some areas have more consistent resources, regulations and monitoring practices than others.

According to Janet Guthrie, general manager of the North Plains Groundwater Conservation District, oil and gas producers can secure groundwater use with private contracts in a similar way to general mineral rights leases. State laws require some spacing and use guidelines for industrial groundwater users, but rules differ by district.

Further, Guthrie noted that "rig supply wells" are exempt from permitting in the Texas Water Code. This loophole means that groundwater wells used specifically to supply oil and gas rigs, such as for fracking fluid, don't need permits – or to report to the RRC how much water they use, how much water is needed or how much is withdrawn for other purposes.

Without comprehensive tracking, the full impact of fracking on Texas's water resources remains unknown.

Texas water experts, lawmakers look ahead to 2025 legislative session: The good, the bad and the discouraged ›

Fracking doesn't necessarily require fresh water, a point some oil and gas producers have leaned into in recent years. In a 2022 report from the Texas Produced Water Consortium, companies said they were reusing about 30% of their wastewater. The AGI also noted in 2018 that technology advancements have allowed for a greater reliance on brackish water for fracking, water that is considered too salty for human or agricultural use.

Most groundwater in the Texas Panhandle is used for irrigation or municipal supplies, while mining and manufacturing work combined account for about 5%. However, the industrial share varies by region and aquifer, and depletion can hit some communities harder, especially those already facing water scarcity.

But while oil and gas operations may not be the largest draw on groundwater resources in Texas – as far as we know – that knowledge may be dangerously incomplete. It can't be considered certain that the oil and gas operations are not a significant draw on the water when that data is not consistently tracked.

Even then, monitoring water use, limiting freshwater use, reusing or recycling in the fracking

Water pollution

Meanwhile, many worry less about water use than contamination risks.

The water and chemicals used in fracking, also known as fracking fluid, is made up of as much as 97% water as well as chemicals like acids, biocides, gelling agents and corrosion inhibitors to dissolve minerals and bacteria and prevent corrosion of the pipes. Common ingredients of fracking fluid include methanol, ethylene glycol and propargyl alcohol – some of the same chemicals used in hair bleach, dental disinfectants and antifreeze.

However, as noted by FracFocus, the full extent of chemicals used in a specific company's fracking fluid can be unknown due to disclosure exemptions for some that are considered trade secrets.

This means that if something goes awry during the fracking process, there runs the risk of water full of known and unknown chemicals interacting with water sources both above and below the surface and impacting soil conditions.

The Ogallala Aquifer's highest levels of saturated thickness south of Kansas are focused in the Oklahoma and Texas panhandles, with its greatest saturation in Texas found in its panhandle's northeastern counties. In Texas, from Lipscomb County to as far south as Midland County, the Ogallala's predominant sources of water recharge are the thousands of playa lakes unique to the greater High Plains region. The Ogallala is also considered one of Texas' "unconfined" aquifers, meaning it is not totally surrounded by a less-porous rock barrier.

The Ogallala and its overlaying recharge points also overlap with some of the densest oil and gas-producing areas of Texas, including the High Plains and the Permian Basin.

When it comes to oil and gas production and strategies like fracking, the fracking fluid could interact with the aquifer and risk bringing contaminants into the water supply either directly or through surface-level recharge points.

Dr. Ken Rainwater, a Texas Tech professor emeritus of civil engineering and chair of the Texas Region O Water Planning Group, said the nature of how fracked wells are constructed helps minimize the risk of aquifer contamination.

from escaping before reaching their deep-level destination.

However, in his experience, Rainwater said it has been more common for him to see contamination related to surface-level operations and infrastructure. He recalled one incident in Midland in which a leak in a transport pipeline caused contamination to domestic wells on the north side of town; it wasn't discovered until a man was greeted by a spray of crude oil when he turned on his shower faucet.

Fracking contamination can also happen during transport or storage, whether that be in vehicles or pipes or holding containers. Frac ponds or "frac pits" – lined pits that hold fresh water, produced water, or flowback – can overflow or tear, leaking chemicals, radioactive elements, and other contaminants.

The Texas Commission on Environmental Quality lists gasoline, diesel and other petroleum products as the most common groundwater contaminants in the state. In 2023, most RRC contamination cases were focused on oil and gas pollution cleanups. Meanwhile, TCEQ's groundwater cases mostly involved petroleum storage tank leaks.

FracFocus noted produced water and flowback fluid from fracking operations are most often disposed of as waste by being injected deep underground. Again, this has the opportunity for issues with placement, storage or transportation via plumbing and other infrastructure issues.

Boomtown tremors: the link between oil production and earthquakes in Texas ›

Most fracking wastewater is injected deep underground, but this has risks. The USGS and others, such as a 2023 study based on data from Kansas oil and gas operations, have noted fracking operations can be linked directly to an increase in earthquakes in the central US in recent years. Deep-injection wells, which store produced water and flowback, operate longer and inject more fluid than fracking itself – driving seismic activity. Regardless, fracking directly increases wastewater volumes, adding to the problem.

Air pollution and emissions

Fracking, especially when combined with horizontal drilling, has driven a sharp rise in US gas production since the early 2000s. A Texas A&M University study reported fracking produces

increase in atmospheric methane.

Methane joins carbon dioxide among critical greenhouse gases that add to global warming, according to Cornell, and shale gas production in the US – which is reliant on fracking- between 2009 and 2019 may have contributed more than half of the global increase in emissions from fossil fuels. Methane can trap around 30 to 90 times more heat in the atmosphere than carbon dioxide, as reported by the Intergovernmental Panel on Climate Change.

Methane is also a major component of natural gas, which is mostly made up of methane and other hydrocarbons.

Environment Texas noted methane may be released into the air through pipeline leaks, venting or flaring – a process in which released gas from a wellsite is burned. Flaring also often releases chemicals into the air including sulfur dioxide, ammonia or Volatile Organic Compounds. Some VOCs, such as benzene or toluene, have been linked to cancer, miscarriages and birth defects. General emissions from oil and gas operations have been further linked to respiratory and neurological issues.

Venting and flaring have also been criticized on an economic level by the IEEFA, for the processes not functioning to stabilize supply and demand for oil and gas and meanwhile resulting in the waste of a significant amount of sellable gas.

“Flaring is a gratuitous display of oversupply with detrimental consequences for the environment and is, simultaneously, an impediment to the growth requirements of the Texas economy,” said the IEEFA in a 2020 report.

While flaring specifically has become more common than ever, the IEEFA contended the practice has not had a positive effect on the profitability of the oil and gas industry.

“If the flaring volumes estimated by the Energy Information Administration (EIA) for 2018 had actually been sold on the market, IEEFA projects that it would have resulted in $749.9 million in revenues to oil producers,” the report further noted.

The PPROA also noted the economic effects of venting and flaring in depressing other markets. Ramped-up oil and gas production in the Permian Basin in recent years and the related lowering of prices, particularly with gas, negatively impacted the profitability of the gas-dominant industr

"something we have to live with," the volatile nature of the prices nevertheless can prove harmful to local businesses and communities that rely on the market.

Texas technically restricts flaring under Statewide Rule 32, requiring operators to sell or use their gas. However, a Commission Shift report found that the RRC frequently grants exemptions, allowing producers to flare beyond legal limits.

Commission Shift said the RRC often issues exemptions to the rule to allow for large and small oil and gas producers to flare beyond the time frame and in amounts greater than may strictly be needed. Further, exemptions exist for certain cases of unreported, reported and permitted gas releases and particularly for lower-producing wells.

"Texas' contradictory flaring rules ostensibly prohibit waste and mandate conservation, even as they permit huge volumes of gas to be flared – sometimes with no regulation whatsoever," said the September 2020 Commission Shift report, which further criticized regulations being rendered moot through the sheer number of granted exceptions by the RRC.

Environmental contamination and degradation

Fracking's environmental impact extends beyond emissions, disrupting land use, contaminating soil and water, and leaving cleanup costs to taxpayers.

Around two-thirds of Texas farmers did not own the mineral rights under the land they farmed as of 2014. While it isn't uncommon for agricultural producers to sell mineral rights to raise money during lean years, that means they may not be able to move against or stop drilling operations that put cropland out of commission. Between infrastructure needed for operation and maintenance, Environment Texas said up to 23 acres of surface land may be disturbed per oil and gas well pad, which can disrupt wildlife as well as other agricultural pursuits.

Fracking fluid or wastewater produced as a result of fracking could also cause harm to crops or livestock if it comes into contact with soil or otherwise used water. Rainwater noted leaks may cause soil contamination and loss of vegetation.

Rainwater noted that while some petroleum contaminants degrade naturally, soil contamination often requires removing and replacing damaged soil. In the past, a common practice of oil and gas producers has been to dig up large amounts of contaminated soil and bury it with new soil in

would have to independently gather contamination data to pursue complaints with the RRC.

Commission Shift and the Sunset Advisory Commission have also previously pointed out that the bonds bought by oil and gas operators in Texas only cover around 16% of well plugging and cleanup costs, leaving the rest of the cost of many site cleanups to the state and its taxpayers. As mentioned previously, state-run well plugging and cleanup operations can take several years once the state actually gets custody of a site, potentially leaving undiscovered issues to fester.

However, the PPROA members said oil and gas interactions with other sectors, such as agriculture and environment, turn out differently in smaller business-centric areas such as the Texas Panhandle. Because so many oil and gas producers are small companies based in the area, even if larger corporations may hold shares, the relationships with landowners and communities to avoid and otherwise solve issues are more collaborative than elsewhere.

“The important thing is everybody’s a good team player, because we’re all striving for betterment of ourselves and betterment of our communities,” commented Buckles, who comes from generations of farming and ranching.

Still, environmental risks remain, even where cooperation exists. PPROA members agreed on the benefits of standing practices and regulations to protect soil, air and water, and future regulations to limit potential damage while keeping the needs of smaller businesses and communities in mind.

The future of fracking

In the mid- and long-term, market instability, competition from renewables, transport electrification, and investor concerns over climate risks have and will continue to hurt the petroleum sector’s value, the IEEFA said.

As the oil and gas industry becomes more dependent on volatile outside forces, such as overnight market impacts like the COVID-19 pandemic and the Russian invasion of Ukraine, the IEEFA contended it has notably decreased its long-term viability.

Global oil and gas demand is expected to peak by 2030, with declines of 45% to 75% by 2050, according to the IEA.

may lie in a focus on gas and petrochemical manufacturing, as well as putting skills and resources toward developing technologies like hydrogen, carbon capture, offshore wind and biofuels. Still, those investments would require major changes to the way the oil and gas industry operates, particularly in the funding strategies of the energy sector.

Fracking remains deeply embedded in US oil and gas production. Some states have moved to ban or limit it, but federal efforts have stalled in Congress. But for now, oil and gas production is unlikely to move away from fracking.

The EPA's 2024 Waste Emissions Charge bills large methane emitters and offers funding for states to reduce emissions, monitor pollution, and restore land. However, in February 2025, Congress passed a resolution to begin repealing that rule.

As part of the Methane Emissions Reduction Program, the EPA has offered financial assistance to support state efforts to voluntarily reduce emissions and low-production wells, monitor emissions and conduct environmental restoration. There are also competitive grants available to reduce, monitor, measure and quantify methane emissions from the oil and gas sector.

All the same, critics of the oil and gas industry have continued to encourage further legislative action to regulate it at large as well as specific practices such as fracking. Commission Shift and others have called for measures such as requiring the recycling and reuse of produced water and flowback fluid, as well as changes to oil and gas operation permits, monitoring, well plugging, site cleanup and standards enforcement.

Trump, Texas GOP's deregulation push sparks hope and fear in the oil field

Oil and gas producers, including those in the PPROA, have opposed broad regulations they say could harm small operators, particularly methane limits and monitoring on generations-old well fields in the Texas Panhandle.

On the other hand, the PPROA members also agreed on the benefits of standing and future regulations to limit waste and protect soil, air and water, even if they emphasized the need for those regulations to be flexible enough to work with individual community circumstances. For example, members positively mentioned rules and practices that prevented the burning of tank oil amid the 2024 Texas Panhandle wildfires, and those that could limit the possibility of similar

Because of the volatility of oil and gas as a commodity market, PPROA members like Beyea also called for legislative action to help safeguard communities that may be disproportionately impacted by industry changes or failure. That instability can cause rural communities, and their schools and hospital districts, to shift unexpectedly from being able to cover their needed expenses to finding themselves suddenly without large portions of their budgets often filled through oil and gas-related tax revenues.

Both critics and industry leaders have agreed the future of fracking, and the industry at large, remains uncertain. What happens next will depend on political action – locally and globally – in the years ahead.

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