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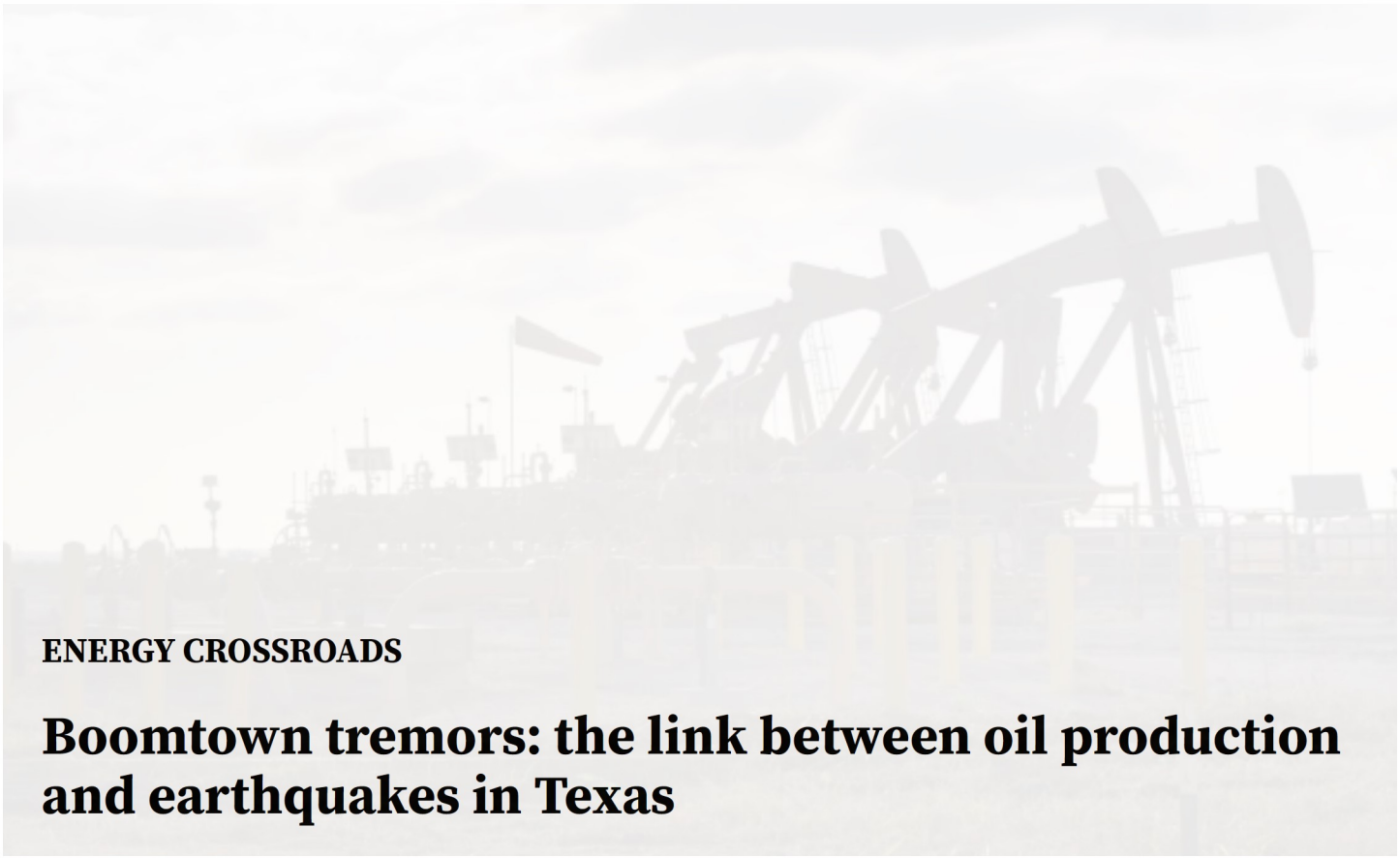

ENERGY CROSSROADS

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

Oil Pump Unit Pumping in the Eagle Ford in South Texas
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Posted: Mar 10, 2025 / 12:05 PM CDT
Updated: Mar 10, 2025 / 12:05 PM CDT

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Project Summary:
This story is supported by the Pulitzer Center and is part of the "Texas Energy Crossroads" project, a partnership between The Hill and Nexstar Texas stations examining the oil and gas industry and the politics surrounding it following President Trump's second inauguration.

PERMIAN BASIN, Texas (KMID/KPEJ)- The Permian Basin has long been at the heart of America's energy industry, fueling economic growth with its vast reserves of oil and gas. But as drilling intensifies, so does another phenomenon: seismic activity. Recent research and monitoring efforts by the Texas Seismological Network (TexNet) have shed light on the region's increasing earthquake frequency, raising questions about the link between oil and

gas operations and induced seismicity.

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Since 2010, oil production in the Permian Basin has surged, transforming the once-declining region into one of the most productive oil fields in the world. As of late 2023, the Permian accounted for nearly half of U.S. oil production, with Texas counties producing over 4.1 million barrels per day.

Yet, alongside this economic boom, earthquakes in the region have also been on the rise. Data from TexNet shows a northeastward migration of seismic activity, particularly in the Midland and Delaware Basins. This shift raises concerns about whether oil and gas operations, particularly wastewater injection and hydraulic fracturing, are playing a role in triggering these quakes.

Dr. Savvaidis and his team have been closely studying the fault systems underlying the Permian Basin. According to their findings, many of these faults existed long before drilling operations began, but increased fluid injection into the subsurface may be reactivating them.

“We do some statistics on the rate of seismicity…there are some specific trends on the different clusters of earthquakes that have been developed through time, and those are related to hydraulic fracturing or saltwater disposal,” Dr. Savvaidis said. “Now we’re evaluating and assessing new subsurface models, earth models, and that can help us to better identify the depth of the earthquakes and that can be related to the different type of operations…”

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One major contributor is wastewater injection, the process of disposing saltwater byproducts from fracking into underground wells.

“Deep injection wells, in particular, are linked to higher-magnitude earthquakes,” Savvaidis shared. “Whereas shallower injections seem to be less hazardous in terms of large seismic events.”

Watch: Dr. Savvaidis discusses how wastewater injection impacts fault systems over time:

As seismicity increases, both regulators and industry leaders have been working to mitigate risks. Some companies have adjusted their fracking practices, while Texas regulators have imposed restrictions on injection well locations and depths. These measures aim to curb the growing seismic activity, but challenges remain.

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Dr. Savvaidis noted that these efforts have already shown some results.

“Since 2023, seismicity in the Delaware Basin has started to decline. However, in the Midland Basin, which is the eastern part of the Permian Basin, things are a little bit different. The seismicity hasn’t been pretty high at the beginning of the monitoring period since 2017, but recently, 2021, 22, 23, and 24, we see a small increase.”

Despite these measures, the question remains: Could stronger earthquakes be on the horizon? Dr. Savvaidis said it’s possible.

“Yes, that’s the case. If we have an increase in the frequency of earthquakes, and especially with the trend of not only increasing the rate, but also increasing the magnitude, then that shows a growing risk of larger magnitude quakes in the future.”

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Watch: How oil and gas industries mitigate tension in the ground that could attribute to seismic risks:

The push for increased drilling, specifically in the Permian Basin, has become a political rallying cry. President Trump and many State and federal leaders have embraced the “Drill, Baby, Drill” approach, advocating for fewer restrictions on oil and gas production to boost energy independence and economic growth.

“We have more liquid gold under our feet than any nation on earth…I fully authorize the most talented team ever assembled to go and get it…By unleashing American energy, we will defeat inflation and dramatically lower costs. … It’s called drill baby drill,” Trump said in his most recent address to Congress.

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While the push for drilling continues, seismic researchers caution that drilling activities should be carefully monitored to mitigate and prevent the risk of induced earthquakes

Dr. Savvaidis emphasized that scientific monitoring should play a role in shaping policy decisions. “We don’t know yet if this aggressive drilling in the Permian Basin will create problems and increase the seismic risk. Maybe yes, maybe no. The key here…is that we

have to monitor everything.”

While seismic researchers provide crucial data to inform energy policy, the oil and gas industry remains a powerful economic force in Texas and beyond. Some policymakers argue that prioritizing energy production should take precedence, even as earthquake concerns grow. Others stress the need for stricter regulations to mitigate potential hazards. The question remains: Will lawmakers find a balance between economic prosperity and seismic safety?

“Monitoring is key,” says Dr. Savvaidis. “Our role at TexNet is to provide the best possible data to inform both policymakers and industry leaders. If we work together, we can find ways to reduce seismic risks while sustaining energy production.”

The conversation surrounding seismicity in the Permian Basin is far from over. As technology advances and research deepens, the balance between economic development and environmental stability remains a critical challenge for Texas and the nation.

Watch: Dr. Alexandros Savvaidis, manager of TexNet, explains the role of seismic monitoring in Texas: