What Carbon Storage Developers Need to Know About Legacy Oil and Gas Wells

Amanda Veazey

EDGE Engineering & Science, LLC

October 21, 2025

HIDDEN WELLS, HIDDEN RISKS

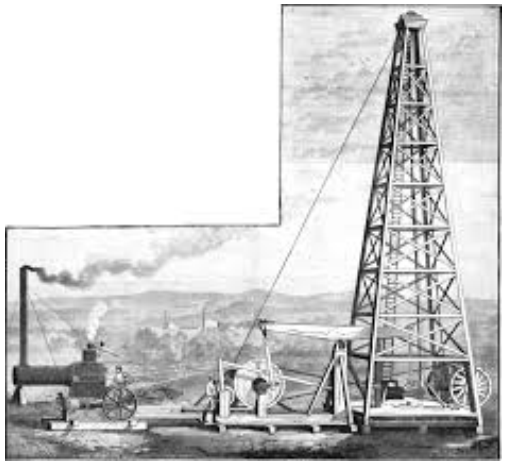
EDGE ENGINEERING & SCIENCE *further insight.*

The carbon storage future is built in landscapes shaped by past energy production.

Understanding legacy wells ensures safe, durable CO_2 storage.

LEGACY WELLS AND CARBON STORAGE: THE PAST BENEATH OUR FUTURE

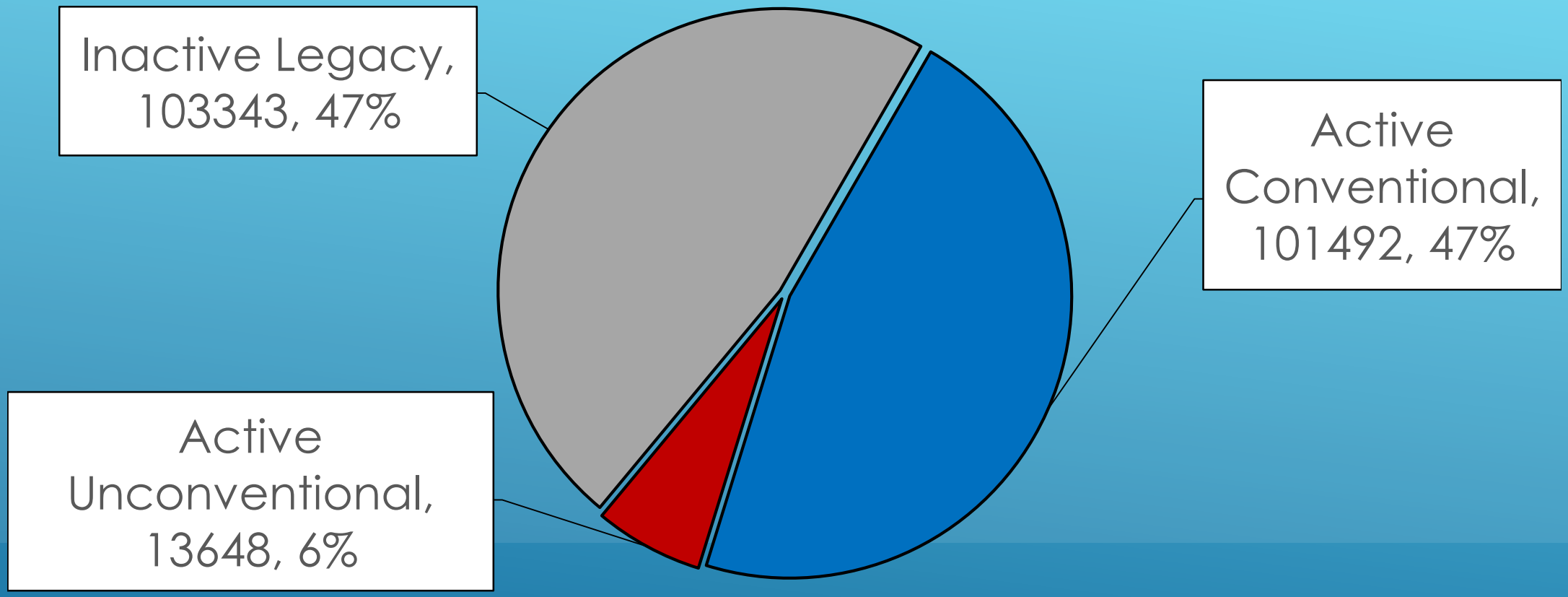
WHAT ARE LEGACY WELLS?



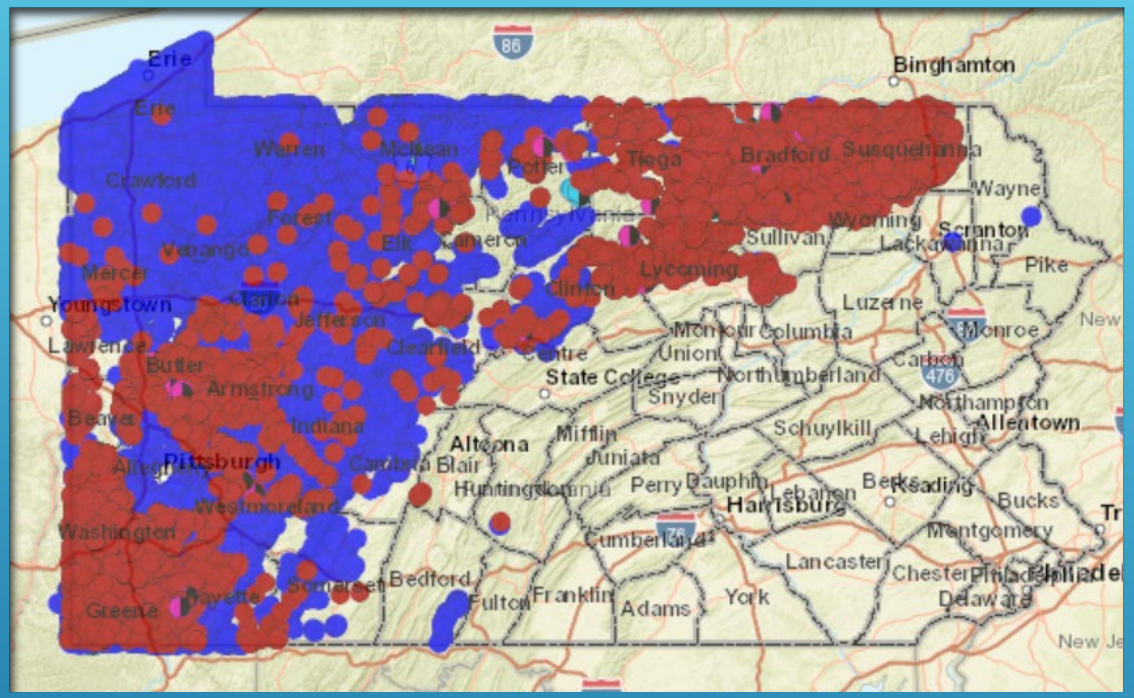
PENNSYLVANIA OIL AND GAS DEVELOPMENT TIMELINE

Major Oil and Gas Drilling Periods in Pennsylvania

Drake & Early Oil	Early Expansion	Post-WWII Boom	Modern Regulation Begins	Shale Revolution
1859–1880s	1900–1930s	1945–1970s	1980s-1990s	2004–present
Shallow oil	Oil & shallow gas	Conventional oil & gas	Conventional decline	Unconventional (Marcellus/Utica)
None	Minimal	Basic reporting	1984 Oil & Gas Act	Act 13 (2012), Ch. 78a (2016)
Many unrecorded wells	Poor records, many “lost”	Limited plugging	Orphan wells accumulate	Overlap with legacy wells

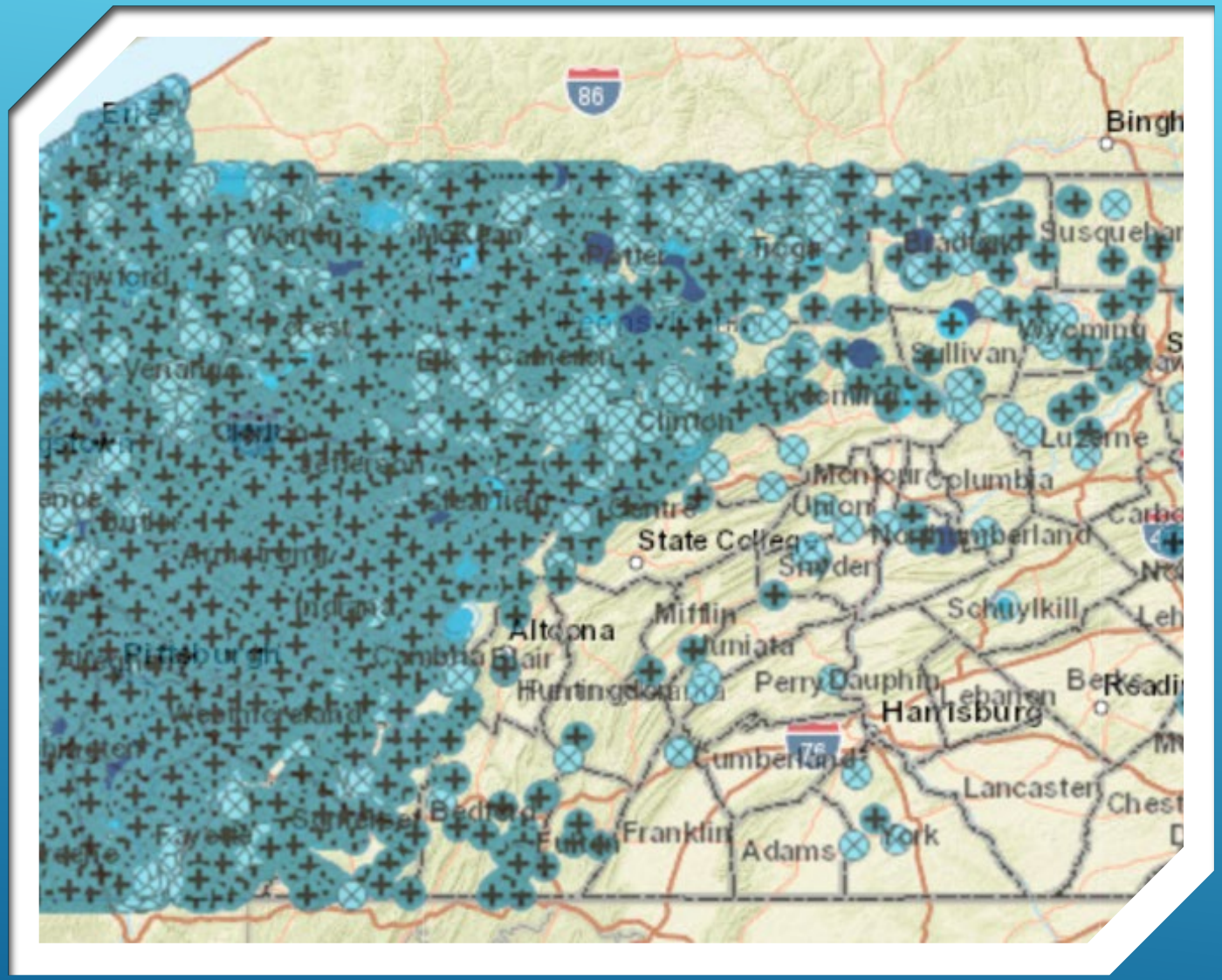


OIL AND GAS WELLS IN PENNSYLVANIA



- Blue: Conventional wells, vertical, various formations and depths, generally <3,000', primarily pre-2010
- Red: Unconventional wells, mostly horizontal, generally Marcellus and Utica Shales, mostly >5,000', post-2008

ACTIVE OIL AND GAS WELLS IN PENNSYLVANIA



LEGACY OIL AND GAS WELLS IN PENNSYLVANIA

LEGACY WELLS AND CARBON STORAGE: THE PAST BENEATH OUR FUTURE

CARBON STORAGE OPPORTUNITIES

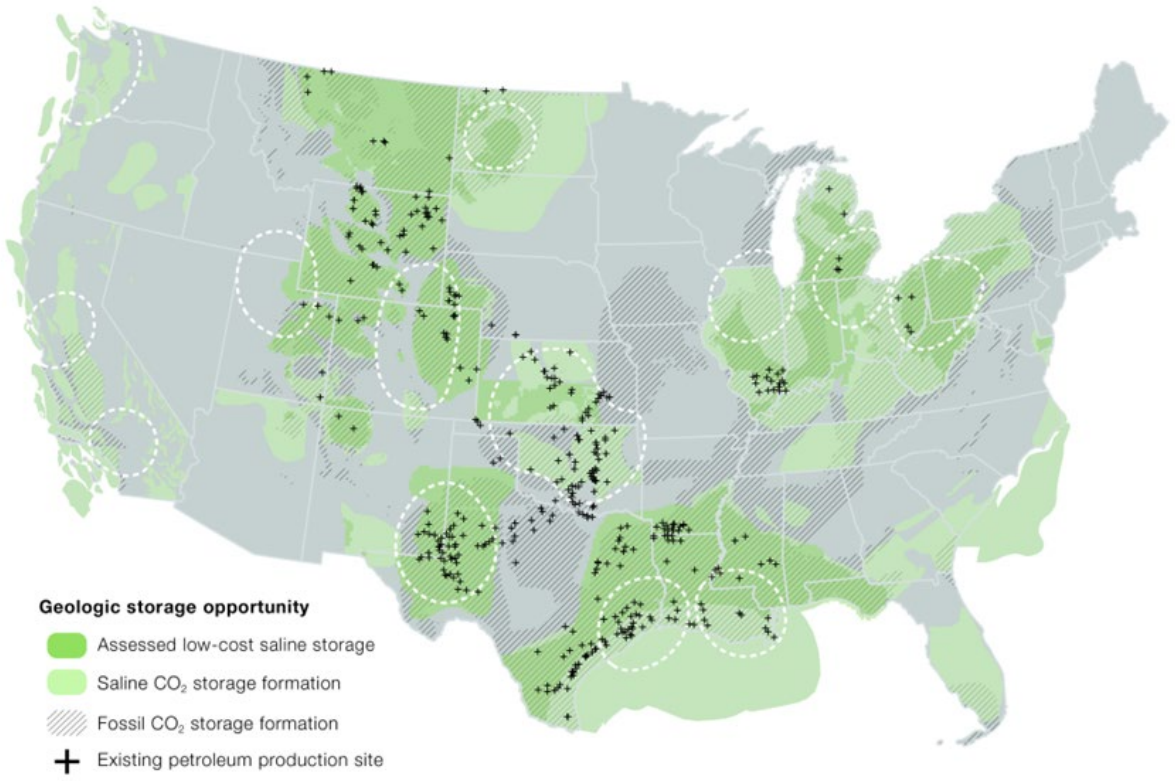
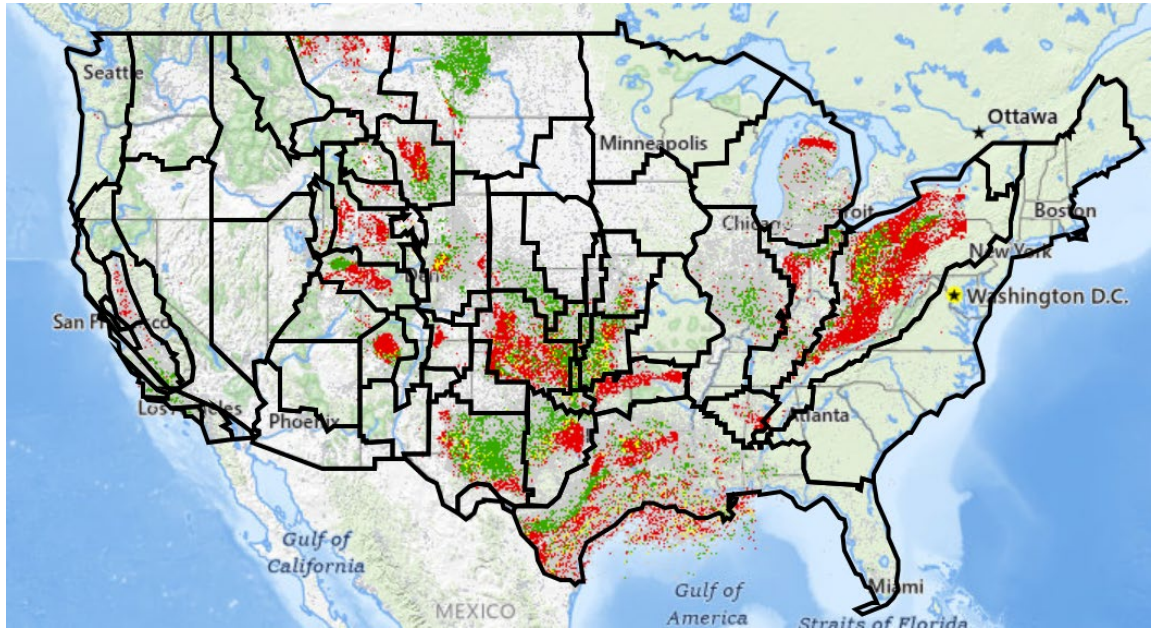


Figure authored by GPI based on ARI (September 2018), Middleton et al. (September 2020), NATCARB (NATCARB_Saline_v1502; October 30, 2015), HIFLD (September 21, 2017).

OIL AND GAS WELLS IN THE CONTINENTAL U.S.



Over 3 million estimated legacy wells in the U.S.

Tens of thousands near likely CCS targets.

Many lack accurate location or depth data.

SCALE OF THE CHALLENGE

DETECTING THE INVISIBLE

Detection tools: magnetic surveys, LiDAR, remote sensing, historical digitization.

Data integration: combine state oil & gas records, imagery, and geophysical data.

Prioritize field verification in high-risk zones.

RISK MITIGATION AND COLLABORATION

Integrate	Integrate legacy well data early in site screening.
Mitigate	Mitigate: replug or isolate wells within pressure influence zones.
Collaborate	Collaborate with state orphan well programs for shared remediation funding.

POLICY AND PUBLIC PERCEPTION

Public concern centers on leakage and safety.

Transparent communication about legacy wells builds trust.

Cleanup programs provide local economic and environmental benefits.

OPPORTUNITY AND NEXT STEPS

Addressing legacy wells strengthens the CCS framework.

→

Combined orphan well and CCS funding accelerates cleanup and deployment.

CLOSING MESSAGE

- Integrate data early.
- Build public confidence through transparency.
- Turn our energy past into a foundation for climate progress.

AMANDA VEAZEY

EDGE ENGINEERING & SCIENCE, LLC

AMVEAZEY@EDGE-ES.COM

EDGE

ENGINEERING & SCIENCE

further insight.