The Integrity Premium

Orphan wells, methane, and the case for carbon credits the market can actually trust

Tahom Climate

Abstract. Texas has roughly 11,000 documented orphan oil and gas wells, unplugged, unmonitored, and continuously emitting methane. The economics of sealing them can be made to work through verified carbon credits, and institutional buyers have demonstrated real willingness to pay for methane reductions. It is not demand blocking the market, nor is it technology. It is the absence of a credible, active methodology for producing credits that hold up under scrutiny. This paper argues that building that methodology, to a higher standard than the market has accepted and with the buyer's defensibility requirements designed in from the start, is both the right call and the commercial opportunity.

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1. The Texas problem

Texas holds the largest documented inventory of orphan wells in the continental United States. These are wells whose operators went insolvent or walked away, leaving no one legally or financially responsible for sealing them. The state holds nominal liability and runs a plugging program funded at a fraction of the scale the problem requires.

The count does not hold steady. Every year, marginal operators fail and additional wells join the list. The ones already on it do not sit quietly in the meantime. Steel casing corrodes. Cement degrades. A well that seeps today leaks worse in five years. Like a pipe rusting through from the inside, the failure compounds without announcement, and the cost of doing nothing climbs with it.

What a leaking orphan well does is easy to understate because the emissions are invisible. Methane is colorless and odorless. It traps heat roughly 84 times more effectively than carbon dioxide over a twenty-year window. Beyond the climate impact: benzene and other volatile organic compounds travel from well sites into the air breathed by communities within a kilometer. Failed casing allows hydrocarbons to migrate into shallow aquifers. Unplugged wells with active pressure can blowout, vent hydrogen sulfide, or pool flammable fluid at the surface.

Picture the solved version. The highest-emitting wells are located, measured, and permanently sealed. The methane stops. The air clears. The aquifer risk drops. The work is paid for not by Texas taxpayers but by the buyers of the verified reductions it produces. This is not a subsidy

program. It is an infrastructure cleanup financed by a market. That is the only mechanism with any prospect of matching the scale of the problem.

2. Why it has not been solved: the methodology vacuum

If the case is this clear, the question is why it is not already happening. The answer is neither technical nor a matter of buyer demand. The industry agrees these wells need sealing. Buyers have shown, in completed transactions, that they will pay for high-quality methane reductions. The obstacle is narrower: there is no trusted, active methodology for producing the credits correctly.

Carbon markets spent roughly a decade optimizing for issuance volume rather than credit durability. Methodologies were built to maximize how many credits a project could generate, not how well each credit would withstand scrutiny. Buyers retired those credits in good faith and later found themselves named in investigations when the underlying claims failed. The legal exposure was real. Registries tightened standards and in some cases withdrew methodologies entirely. The American Carbon Registry, which maintains the methodology most directly applicable to orphan well plugging, made it inactive in 2025 to rebuild it, with a revised version expected.

A market where demand is demonstrated, where buyers are willing to pay, and where the only missing element is a credible settlement mechanism is not a broken market. It is a proven market with a missing piece. The concept works and the demand is real. What is absent is a developer willing to do the meticulous, unglamorous work of building a methodology that holds, and to do it before the new rules are finalized rather than after the space fills up again.

Tahom's founders did not come from inside the carbon market. They came from operating and capital backgrounds. One of them spent years in oil and gas work that built a direct relationship with the Texas Railroad Commission, the body that holds custody of orphan wells and administers the state plugging program. That access, combined with an outsider's read on why this market kept breaking, is where the company began.

3. A methodology built for the buyer

Here is where our approach diverges from the convention of this market. We are building our methodology with the buyer in mind.

To a certain orthodoxy in carbon markets, that reads as a conflict of interest. The assumption is that a credit's integrity requires the developer to hold the buyer at arm's length plus, as though commercial proximity were a contaminant. That assumption is wrong, and it is a primary reason this market has failed repeatedly.

What does a serious institutional buyer actually need? A corporate sustainability team retiring credits is not shopping for the cheapest tonne. It is shopping for a credit that will not appear in an

investigative report two years later. It needs conservative baselines, transparent measurement, independent verification, and additionality so clear it requires no argument. Designing to those requirements does not lower the standard. It raises it, because the buyer's requirement and the planet's requirement are the same: a tonne claimed must be a tonne real.

The word this market tends to avoid is greenwashing. The fear of that accusation, well-founded or not, is what keeps serious capital on the sidelines. A credit built to survive institutional due diligence cannot be credibly accused of greenwashing, because every link in the chain, from the measurement and the baseline to the verification and the additionality, was designed to hold under exactly that examination. Aligning our economics with the buyer's reputational exposure is not a compromise of the process. It makes the credits worth buying and creates the alignment needed to allow the market to thrive.

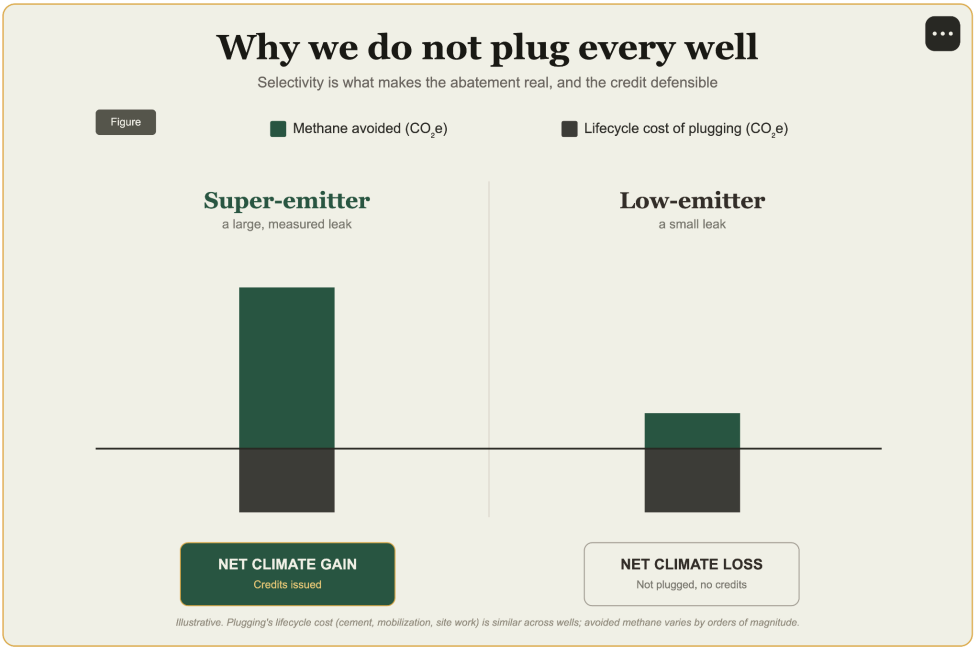
It is also what funds the work. Plugging wells is expensive. The capital comes from credit sales, and credits sell at scale only when buyers trust them enough to commit before delivery. When those incentives are misaligned, the capital does not flow. When the capital does not flow, the wells stay open. Anyone who insists the developer and the buyer must be kept apart should answer a simple question: under that arrangement, which well gets plugged?

4. How the method works

The work begins with identifying where to look. Methane emissions from orphan wells are not distributed evenly. Peer-reviewed atmospheric measurement studies, including Williams et al. (2021), Riddick et al. (2024), and Follansbee et al. (2025), consistently find that the great majority of total emissions come from a small fraction of wells: the super-emitters. Plugging every well regardless of emission rate would deploy most of the capital into wells that barely leak. We built a detection funnel that moves from broad remote sensing to aerial survey to instrument-grade ground measurement, well by well. Every plugging decision is made against a confirmed, site-specific measurement, never against an assumption.

This is also why we do not plug every well. Sealing a well is not itself free of emissions. Cement manufacturing, equipment mobilization, and site remediation all carry a carbon cost. On a low-emitting well, that cost can exceed the emissions it stops. The net effect would be more atmospheric methane, not less. A program claiming credits on those wells would be selling reductions that are, properly measured, negative. We will not do it. We are evaluating issuance pathways against three criteria: active status, the rigor of third-party verification, and buyer acceptance. We will commit to the registry that best serves credit integrity, not the one that issues the fastest. We plug only where the math is unambiguous, and we say so plainly, because the willingness to decline easy credits is itself a signal about the credits we do issue.

Figure 1. Why we do not plug every well



Illustrative. Plugging's lifecycle carbon cost is similar across wells; avoided methane varies by orders of magnitude.

When a well is sealed, the standard is permanence in the physical sense, not the marketing sense. A reduction that quietly reverses is a delay, not an achievement. The commitment we make is simple to state and demanding to keep: we do whatever the work requires in materials, execution, and long-term monitoring to ensure that a sealed well stays sealed and that the reduction claimed is the reduction that occurs. That includes verification after plugging, not only at completion but over time, using the best post-plug monitoring available, including a patented post-testing solution currently under evaluation. A reduction nobody checks is a reduction nobody should pay for.

Credit accounting uses the hundred-year global warming potential the registry requires, roughly 28 times the warming impact of carbon dioxide per unit of methane. The twenty-year figure, 84 times, describes the urgency of acting on methane. The hundred-year number is what we are willing to put our name to on a credit. We would rather understate and be trusted than overstate and be caught. That being said, 2030 is around the corner; the clock is ticking.

5. Who buys this, and why

The buyers for these credits differ from each other in ways that matter. We call them enterprise buyers, institutions capable of committing at scale. They fall into recognizable categories.

Technology companies with net-zero and carbon-negative targets are the most active buyers in the voluntary market and are building methane into their procurement. Their primary concern is not price. It is provenance. They need documentation their investors and regulators can audit. Oil and gas companies that have signed methane-reduction pledges face a gap between their public commitments and their internal progress. A credit from the permanent elimination of methane at abandoned predecessor wells has a narrative coherence for that buyer that other credit types do not. Aviation companies under international offsetting frameworks have structural, rules-based demand for high-quality reductions. Financial institutions with financed-emissions exposure from their lending books need defensible offsets tied to that liability. Mission-aligned foundations are less buyers than catalytic funders; they provide first-loss or program capital drawn by outcomes that are measurable, permanent, and auditable.

One factual point distinguishes a serious buyer conversation from a naive one: under science-based-target frameworks, methane credits are not applied against a company's core emissions reduction targets. They fund mitigation beyond the company's value chain, sitting alongside reported reductions rather than substituting for them. Sophisticated buyers already know this. Stating it plainly is more useful than obscuring it, because the guidance on procurement now explicitly prioritizes near-term methane reduction. Methane exits the atmosphere within roughly twelve years, making reduction in this decade physically measurable within the climate planning horizon in a way that CO_2 reduction is not.

The commercial thesis is fiduciary demand, growing in volume and in the obligations that drive it, meeting a supply of high-integrity, measurement-gated credits that is genuinely scarce. These are not renewable assets. A well is plugged once. The reduction is captured once. Supply does not replenish. A buyer who commits early, before field measurement and before the broader market reprices, locks in supply at today's terms. That is the structure behind the forward commitments through which the work is financed.

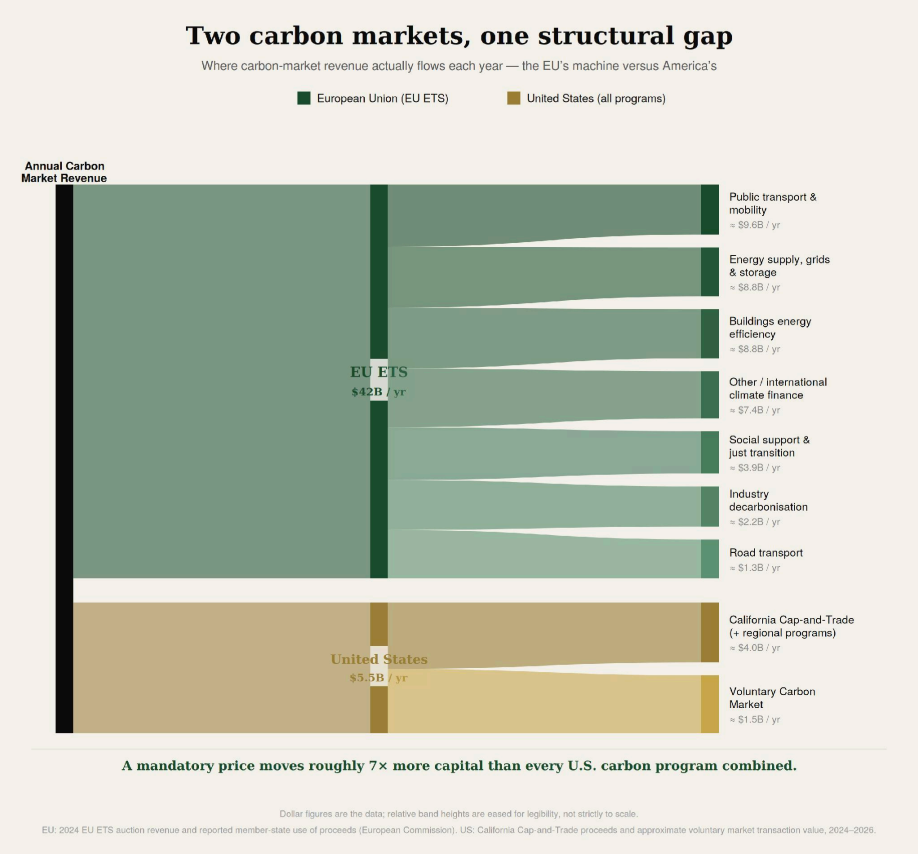
6. What Europe built, and what America can still win

Pull back from Texas for a moment. The most important fact about carbon pricing today is geographic, and it does not favor the United States.

Europe priced carbon by law. The European Union Emissions Trading System is the world's oldest and largest mandatory carbon market, covering roughly 40 percent of the bloc's emissions across ten thousand industrial installations, the power sector, aviation, and now shipping. The price is enforced, recently in the higher end of €70-80 per tonne as of June 2026, and the system has raised more than 250 billion euros since 2013, roughly 39 billion in 2024 alone. Banks, funds, and trading firms hold allowances and their derivatives. Carbon in Europe behaves as an asset class. With its Carbon Border Adjustment Mechanism in force, Europe is now exporting that price to any country that wants to sell into it.

America has no federal carbon price. What exists is a patchwork: California's compliance market, which has raised roughly 28 billion dollars since 2013 at a in the range of 38 dollars per tonne; a smaller northeastern program; a set of tax incentives from the Inflation Reduction Act that subsidize clean energy without pricing emissions; and a voluntary market where many credits change hands in the single digits per tonne. Capital follows structure. The structure is in Europe. Some of the largest American asset managers now deploy billions into European climate infrastructure. In one recent case, a single commitment ran to two billion euros for a European renewables developer, while the carbon market at home stays thin.

Figure 2 - Two carbon markets, one structural gap



Annual carbon-market revenue and where it flows, EU versus US, drawn to comparable scale.

America is not simply losing. That conclusion misses what matters. A mandatory price creates demand by force of law. Like any command market, that allows volume to scale, but disincentivizes the creation of high-integrity supply. That has to be built. Building it, with rigor,

at scale, through private capital and operating execution, is the one part of this market where the United States, and Texas more specifically, holds every structural advantage.

America has the physical asset base: more than a hundred thousand documented orphan wells, with the undocumented count almost certainly higher. Each is a measurable, additional, permanent reduction. The private capital and the risk appetite exist to fund the work without a government mandate. Because the model runs on corporate and voluntary demand rather than a legislated price, it does not depend on an election result. The program works regardless of Washington's posture.

The race is not to be the cheapest source of credits. It is to be the source the world trusts, established in the United States before anyone else does it. Texas is where that begins. The model scales by state, and in time beyond.

7. The legacy, and a word on conviction

Strip away the market mechanics. What remains is a cleanup. The air over Permian Basin communities improves. Aquifers under farmland are no longer exposed to migrating hydrocarbons. Pressurized hazards near homes and public land are removed. The financial burden shifts from public budgets onto the parties who benefit from the reductions, and no taxpayer dollar is spent.

Most climate ventures require a trade. A project is either economically viable and only marginally impactful, or deeply impactful and structurally dependent on subsidy. Orphan well plugging does not force that trade. The same intervention that produces a defensible financial return also produces a large, permanent, measurable climate and public-health outcome. These situations are uncommon. They tend to look obvious in retrospect.

The work between now and obvious is unglamorous. It means building a methodology that holds under adversarial scrutiny, walking away from credits that are easy to claim and hard to defend, and committing to measurement and monitoring standards that cost more in the short term than cutting corners would. This is why the opening exists. The market is not short of people who can see the opportunity. It is short of people willing to do the hard part.

That is what Tahom is building.

Selected references:

IPCC Sixth Assessment Report (global warming potential of methane, 28x CO_2e over 100 years, 84x over 20 years; credits are accounted on the 100-year basis).
Williams et al. (2021), Riddick et al. (2024), Follansbee et al. (2025), peer-reviewed atmospheric measurement of orphan-well emission rate distributions.
American Carbon Registry (orphaned oil and gas well plugging methodology, made inactive 2025 pending revision).

Science Based Targets initiative (corporate target adoption, 6,000+ companies as of 2025).
Oxford Principles for Net-Zero Aligned Carbon Offsetting (near-term methane reduction prioritization).
European Commission and ICAP (EU ETS 2024 revenue and member-state allocation data).
California Air Resources Board (Cap-and-Trade auction proceeds).