

WHITEPAPER

25 Well Pads, One Year, \$1.27M Value: How one Alberta producer turned pneumatic venting into carbon offsets



TITLE

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How one Alberta producer turned pneumatic
venting into carbon offsets

LOCATION

Alberta, Canada



Executive Summary

In 2024, an Alberta oil and gas producer engaged Kathairos to eliminate methane venting from pneumatic devices across 25 well pads in the Peace River Arch. Kathairos deployed 25 nitrogen systems over a two-month window, ahead of the 2025 TIER compliance year. Over the following 12 months, the sites generated 13,350 tCO₂e in verified carbon offsets under Alberta's TIER program — valued at \$1,268,250 at the \$95/t TIER price. Kathairos managed the full offset lifecycle: site eligibility review, technology deployment, nitrogen delivery, third-party verification, and serialization. The operator's involvement was limited to supplying pneumatic inventories, gas composition samples, and approving site visit permitting for a randomly selected sample of site visits. This case study details the operator's experience, including the upfront eligibility screening, deployment timeline, and the steps taken to generate, verify and serialize the offsets from the project.

Case Study: One Operator's Experience Generating Offsets From Nitrogen

In 2024, an operator approached Kathairos to eliminate methane venting from pneumatics at 25 well pads across Alberta's Peace River Arch. Kathairos' nitrogen-based technology was deployed across all sites over a two-month timespan (from order to operation) ahead of the start of the 2025 offset reporting year. Following a 12-month period of operating the 25 sites on nitrogen, the company generated 13,350 emissions offsets valued at \$1,268,250 at the \$95/t TIER price.

When Kathairos deploys its nitrogen-based methane elimination systems at eligible facilities, operators can generate emission offsets under Alberta's TIER program.



Eligibility and Deployment

Kathairos screened the 25 sites for offset eligibility by reviewing each well site's overall vent gas (OVG) threshold, production start date, and pneumatic device inventory. To generate offsets, a well site must meet three conditions:

- Combined routine and non-routine vented gas of no more than 15 e3m3/month
- Production start date before January 1, 2022
- All pneumatic devices in operation meet low-bleed compliance (flow rates <0.17 m3/hr)

Kathairos then reviewed the pneumatic inventories of each of the 25 sites to determine projected vent rates. Kathairos uses predictive modelling to establish an appropriate tank size to service the pneumatics at a 30-day N2 refilling cycle (tank sizes range from 265L to 5500L). Kathairos keeps a robust inventory of these patented N2 tanks on hand, storing them in the company's Clairmont, AB yard for fast delivery. Kathairos then circulated a contract to the operator highlighting nitrogen and rental costs, including offset management terms.

Across the 25 well sites, over a two-month period from November to December 2024, Kathairos sized and installed the following tank sizes:

- 14 tanks sized 3000L
- 8 tanks sized 5500L
- 3 tanks sized 1500L

All tanks generated offsets for the entirety of the 2025 compliance reporting period.

Offset Project Execution

After sizing the appropriate tank for each site, Kathairos worked with the operator to deploy the nitrogen technology at the 25 sites in the field. Once the tanks were delivered, commissioned and tied into the pneumatic control loops, the offset project was underway and the sites started generating offsets.

Once the customer's nitrogen tanks were in operation, Kathairos registered the facility locations with Alberta Carbon Registries, adding them to an aggregate project pool (this needs to be done within 30 days of project start). Kathairos actively operates three Alberta Emission Offset Registry (AEOR) registered projects across 130+ sites, generating 40,000+ tCO2e annually. Each aggregate offset pool comprises multiple sites and can generate offsets for a maximum lifespan of 10-years and undergoes a verification and serialization process every 12 to 18 months.

As long as the 25 tanks were delivering pressurized gas to pneumatics, offsets were being generated. The tanks operated normally and effectively over the course of a year, accumulating emission reductions along the way. Once reported and verified, these accumulated emission reductions would be serialized as emission offsets.

How Kathairos Quantifies Offsets

The methodology for quantifying offsets from pneumatics projects is outlined in Alberta's "Quantification protocol for greenhouse gas emission reductions from pneumatic devices (V3.0)." This protocol includes the requirements and provisions for calculating emission reductions from nitrogen systems. Kathairos determines total offsets generated by monitoring liquid level consumption from telemetry units affixed to each tank. Data is reported hourly, 365 days a year, and is accessible to customers through [Kathairos' Atlas](#) dashboard. The more nitrogen consumed, the more methane that otherwise would have been vented, and the greater the number of offsets generated. Emissions from nitrogen transportation and nitrogen production are deducted from the total offsets generated, typically 1–4% of total project emissions.

Offset Reporting and Verification

In early September, Kathairos reached out to the operator to inform them that Kathairos would be starting the offset verification for the 2025 reporting period. Kathairos asked the operator to confirm that the pneumatic inventories for the site were still accurate.

In October, Kathairos contracted a third-party verifier to audit and sign off on the total emission reductions for 2025. (Kathairos typically gets the reporting process started before the reporting period is complete. In this case, November and December data were uploaded in the final stages.) Kathairos provided the verifier a project report that calculated the emissions of each facility in aggregate pool. A project report must be completed for each reporting period. In addition to the project report, Kathairos provided the verifier with additional documentation to support the offset-generation activities:

- General well data indicating facility production start date prior to January 1, 2022 (a Directive O60 requirement)
- Pneumatic device inventories that identify make, model, serial number
- Proof of low-bleed device status, such as manufacturer specification sheets, direct measurement, or protocol emission factors
- Gas composition samples from each facility (if unavailable the Manual 15 defaults of 80% CH₄ / 0% CO₂ apply)
- Proof of Kathairos nitrogen tank installation
- A list of all facilities in the aggregate pool (Aggregate Project Plan Sheet “APPS”)
- Annual maintenance and inspection reports for tanks and pneumatics (failure to complete results in a 3% reduction)
- Calibration records for Kathairos trucks and nitrogen telemetry
- Nitrogen consumption logs
- Nitrogen delivery logs

The verifier also conducts a number of site visits during verification, to confirm that all pneumatics are compliant and that devices in operation match operator inventories. Of the operator’s 25 sites, 6 sites were selected for a site visit. Kathairos handled all aspects of the site visit — notifying the operator in advance of the verifier’s dates, managing permitting, and facilitating in-person supervision of the verifier’s review.

Over the course of multiple months, Kathairos worked directly with the third-party verifier to answer questions and provide on behalf of the operator. Once the third-party verifier was satisfied that the emission reductions did indeed occur at the quantity stated, they issued their own peer-reviewed report confirming the offset attestation. The verifier’s report also indicates any additional pertinent findings that emerged over the course of the verification period.

Serialization & Offset Transfer

Once verification concluded, Kathairos submitted the Project Report, Verification Report, Aggregate Project Reporting Sheet (APRS) and Statutory Declaration to the Alberta Carbon Registry. The ACR reviewed each document for accuracy. Once approved, the Registry assigned a unique serial number for each offset to Kathairos’ registry account.

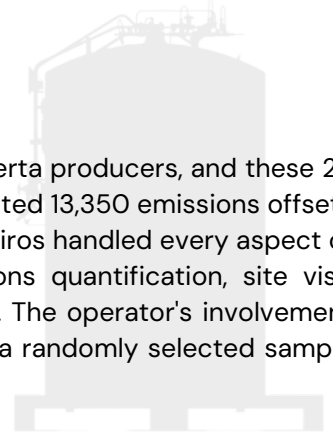
With the offsets now serialized, Kathairos provided the operator with an offset summary report that highlighted findings from the verification process and a breakdown of the offsets generated at each facility.

Kathairos’ offset management fee is a flat percentage of all offsets generated. This low fee covers all project verification and serialization costs. Kathairos retains the fee and then transfers the remaining offsets to the customer’s account.

At this time, Kathairos also asked the operator if they wanted the serialized offsets transferred to their TIER account or sold on their behalf. The offset transfer process is straightforward. Operators can then opt to use the offsets for TIER compliance, sell them, or save them to sell (or “retire”) at a later date.

Case Study: Final Result

Kathairos’ goal is to make the offset process as simple and streamlined as possible for Alberta producers, and these 25 sites proved to be no exception. From January 1 to December 31, 2025, the operator generated 13,350 emissions offsets by deploying nitrogen systems (valued at \$1,268,250). Over the course of this period, Kathairos handled every aspect of the offset generation process — customer onboarding, project administration, emissions quantification, site visit permitting and accompaniment, offset serialization, and final transfer of offset ownership. The operator’s involvement was limited to providing pneumatic inventories, gas composition samples, and approving a randomly selected sample of site visits.



Generate Offsets with Kathairos

Twenty-five well pads. One nitrogen conversion. A registered, transactable carbon asset worth \$1.27M. [Get in touch with Kathairos](#) to scope a TIER offset eligibility review for your own site portfolio and find out what your pneumatic device inventory could generate.

Estimated Nitrogen Usage, Offsets Generated, and Value by Tank Size

The table below is a representation of active eligible offset generating well sites where Kathairos N2 technology is deployed. An operator can expect to consume the below amount of nitrogen over a 12-month period and generate offsets to utilize towards operational expenses.

Tank Size	Average 12-Month N2 Usage (scm)	Average 12- Month Offsets Generated (tCO2e)	Value (at \$95/t TIER Price)
265L	1,370.67	26.60	\$ 2,526.56
265L - LV	2,003.43	38.87	\$ 3,692.92
450L	2,072.97	40.22	\$ 3,821.09
1000L	5,062.66	98.23	\$ 9,331.98
1500L	9,415.09	182.68	\$ 17,354.80
3000L	19,818.96	384.55	\$ 36,532.21
5500L	32,383.79	628.35	\$ 59,692.90