Methane Venting Solution: Liquid Nitrogen Emissions Elimination Skid

SUMMARY

This case study highlights how Alberta's investment in methane innovation has helped local companies develop solutions that are now being used beyond Canada. Through strong collaboration between industry, innovators, and support programs, Alberta has built an ecosystem that helps new technologies move from development to real-world application.

Kathairos is a strong example of this success. The Alberta-based company developed a practical methane reduction solution that has been adopted by oil and gas operators across North America. Through the commercialization of its fully integrated liquid nitrogen emissions elimination skid, Kathairos has achieved $25M+ in commercial deployments, of which 90% comes from projects outside of Canada. Its technology has earned industry recognition and helped establish the company as a trusted provider of emissions reduction, carbon offset, and well-site data services.

Alberta is proud to highlight Kathairos as a homegrown innovation success story delivering meaningful environmental impact while expanding into international markets. The company's achievements reflect the strength of Alberta's methane innovation ecosystem and demonstrate how Alberta-developed technologies, expertise, and services can help address global emissions challenges. Kathairos shows how practical, industry-driven innovation can translate into measurable real-world results and reinforce Alberta's reputation for effective environmental solutions.

TECHNOLOGY INCEPTION AND DEVELOPMENT IN ALBERTA

Kathairos Solutions developed a fully integrated platform that instantly eliminates methane venting at remote well sites by replacing instrument gas with liquid nitrogen to power pneumatics. Each turnkey skid arrives with a cryogenic tank, economizer, pressure-build circuitry, and telemetry hardware, giving operators a complete and practical deployment package.

Once connected to existing pneumatic lines, the system uses liquid nitrogen in place of methane as the pneumatic power source, allowing the producer to retain the gas in the sales line. The solution requires no external power or combustion. Tank sensors provide operational information through a cloud-based portal to support system monitoring and emissions reporting. Through its managed service model, Kathairos coordinates

nitrogen delivery, installation support, routine refills, and maintenance, reducing the operational burden on producers and supporting reliable performance.

ALBERTA FUNDING AND INNOVATION SUPPORT

PTAC and CanERIC were instrumental in supporting the original pilot test of the nitrogen technology from 2020 to 2021. The success of this early field trial created a foundation for broader commercialization. Kathairos then collaborated with PTAC to strengthen technology development by engaging end users, government funders, and innovation ecosystem partners, improving market understanding and supporting widespread commercial deployment. Through PTAC's platforms, including domestic events, the Methane Leadership Summit, Digital Innovation Forum, and international conferences such as CERAWeek, COP 29, and the World Petroleum Congress, Kathairos gained valuable exposure to Canadian producers and international markets. These opportunities helped de-risk international market development and increased the company's growth and visibility across North America. PTAC can also help companies such as Kathairos diversify export opportunities beyond the United States while reducing financial risk through modest funding support. The collaboration between Kathairos and PTAC has contributed to continued growth in sales and employment despite geopolitical headwinds.

TECHNOLOGY COMMERCIALIZATION LESSONS

Kathairos' commercialization experience demonstrates the importance of validating a new technology under actual field conditions and involving operators early in its development. The original pilot allowed the company and participating producers to confirm that liquid nitrogen could replace methane as the supply gas for pneumatic equipment without requiring major changes to existing well-site infrastructure. This early demonstration helped move the technology from a promising concept to a solution that operators could assess based on practical operating experience.

Kathairos also learned that successful commercialization required more than supplying equipment. Operators needed confidence that installation, nitrogen delivery, monitoring, maintenance, and ongoing support could be managed reliably across remote and geographically dispersed locations. In response, the company developed a fully managed service model combining equipment, installation support, scheduled nitrogen refills, telemetry, maintenance, and customer service. This approach reduces the operational burden on producers and provides a predictable pathway for deployment across multiple sites.

Partnerships became another important contributor to commercialization success. Support from PTAC, CanERIC, participating operators, government programs, and other innovation partners created opportunities to demonstrate the technology, share results, increase industry awareness, and build credibility. These relationships supported the transition from an Alberta pilot to broader commercial adoption and positioned Kathairos to pursue opportunities in other jurisdictions.

A key lesson from the Kathairos story is that commercialization support must continue after technical validation. Companies still need to develop service capacity, establish supply chains, respond to regulatory differences, educate prospective customers, and build relationships in new markets. Kathairos demonstrates

how field validation, customer-focused service design, and sustained market development can help an Alberta-developed methane solution advance toward commercial scale.

DRIVERS FOR INTERNATIONAL TECHNOLOGY ADOPTION

International adoption has been supported by the solution's straightforward integration with existing well-site pneumatic systems. Designed for remote sites, the technology requires no grid power, on-site combustion, or extensive facility modifications. This makes it particularly relevant for operators managing dispersed assets where electrical infrastructure may be unavailable, and a practical retrofit is preferred.

Kathairos' service model is also an important driver of adoption. Rather than requiring customers to purchase specialized equipment and independently arrange every element of ongoing operation, the company provides an integrated rental service that includes equipment, installation support, nitrogen supply, telemetry, maintenance, and service. This structure gives operators a clear understanding of implementation responsibilities and allows deployment to expand as operational needs and emissions-reduction plans evolve.

Telemetry and service support enable operators to manage installations across large geographic areas. Remote information supports refill planning, system oversight, and emissions reporting, while the service network helps maintain continuity at the site level. These features make the solution suitable for companies seeking consistent deployment across a portfolio of remote facilities rather than a series of separately managed projects.

Regulatory requirements and corporate methane commitments are increasing demand for solutions that can be implemented efficiently and provide credible evidence of performance. Kathairos' Alberta experience established an early foundation for demonstrating the technology and refining the operating model. As other jurisdictions strengthen methane policies, the combination of a practical retrofit, managed service, and reporting capability supports continued commercialization beyond Canada.

Global markets and policy frameworks are increasingly driving action on methane emissions, creating new opportunities for Kathairos' practical and scalable solution. Operators have been drawn to the simplicity and reliability of its plug-and-play system, which eliminates methane venting from pneumatic equipment and integrates with existing well-site infrastructure. The managed service model combines equipment, installation, nitrogen supply, monitoring, maintenance, and ongoing support, enabling operators to deploy the solution across multiple well sites while advancing emissions-reduction and regulatory objectives.





Figure 1: Kathairos well site methane elimination technology

QUOTES

"PTAC has been a strong advocate of Kathairos and has played an important role in increasing the company's visibility to accelerate technology adoption. Employs liquid nitrogen to eliminate methane vents, streaming real-time data for emissions reporting. Flexible, affordable solution for well sites of all sizes – no power required. $5M external funding achieved"

- Jacqueline Peterson PhD., Chief External Affairs Strategist

CONCLUSION

Kathairos exemplifies how innovation developed in Alberta can be successfully commercialized to deliver significant environmental and economic benefits. Through combining a practical methane reduction technology with a customer-focused service model, the company has transformed an Alberta pilot into a widely adopted solution across North America. Its growth in international markets highlights the value of early field validation, strong industry partnerships, and sustained commercialization support. As methane regulations and emissions-reduction commitments continue to expand globally, Kathairos is well positioned to help operators address these challenges while showcasing the strength of Alberta's innovation ecosystem on the world stage.

PTAC

Petroleum Technology Alliance Canada (PTAC) has supported innovation, operational performance, and environmental improvement across Canada's oil and gas sector for three decades. As a neutral, industry-led organization, PTAC connects industry challenges with practical technology solutions, helping reduce risk, attract investment, and advance innovations from concept to field deployment. Through this work, PTAC continues to deliver value across Canada's energy innovation ecosystem. https://ptac.org/