Whitepaper

From Leak Detection to Network Intelligence: A Critical Shift in Mindset

PICARRO

Introduction

Picarro's innovative solutions revolutionize emissions management in the natural gas industry, enabling operators to transition from traditional leak detection to comprehensive network intelligence. Our integrated solution stack combines advanced hardware, cutting-edge analytics, and robust software to deliver unparalleled insights into methane emissions and operational efficiency.

Network Intelligence Defined

Network Intelligence is a transformational mindset that enables gas utilities to evolve from reactive operations to proactive, data-driven management.

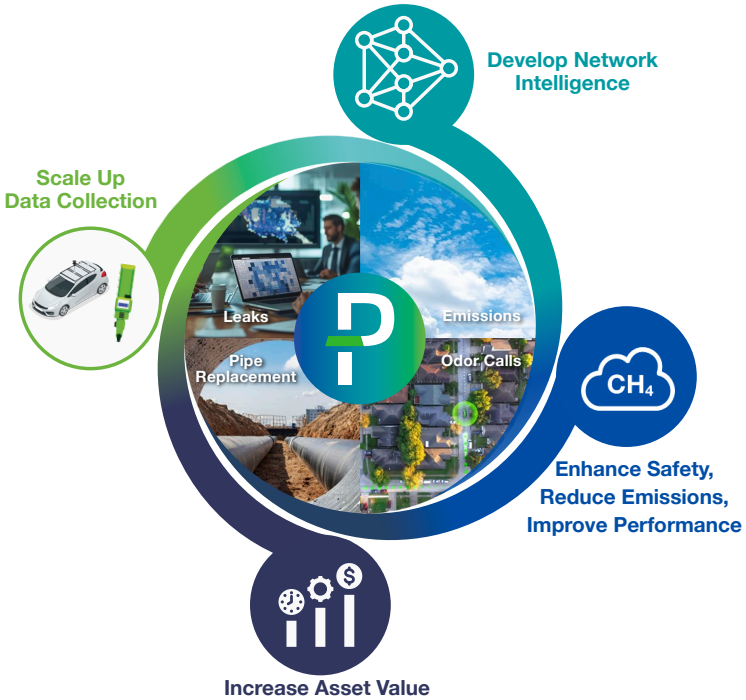

Figure 1. Turning Data into Value: Picarro's network intelligence drives emissions reduction, safety, and smarter asset management through scalable, data-driven insights.

Network Intelligence: Operators leverage AMLD technology to create a data driven, GIS centric representation of a gas network and its emissions. They tap into this holistic and consolidated view to strategically plan maintenance activities, deploy resources and maximize asset value.

So what makes up Network Intelligence? Here are the essential elements:

1. **Comprehensive and frequent scanning** of the entire gas infrastructure using AMLD technology, enabling accurate and quantitative mapping of fugitive methane emissions
2. **Geospatial contextualization** through the integration of multiple GIS data streams—including below- and above-ground gas assets, buildings, weather patterns, ground conditions, and risk models—delivering a GIS-centric frame of reference.
3. **A machine learning-powered analytics suite** that generates a unified, dynamic representation of the gas network—delivering both local insights (such as risk-prioritized leak indications and asset-level field of view coverage) and network-wide intelligence to inform strategic decisions around emissions and risk profiling, OPEX/CAPEX optimization, multiyear trend analysis, forecasting, resource planning, and regulatory reporting.
4. **Native software integration** with existing utility workflow and IT systems, including Work Asset Management (WAM), resource planning tools, DIMP/PSMS programs, GIS platforms, and other systems of record.

A Critical Shift in Mindset: From Leak Detection to Network Intelligence

Natural gas operators face mounting pressures from regulatory requirements, environmental mandates, and investor expectations. Picarro transforms these challenges into opportunities by advocating a shift from traditional leak detection to holistic network intelligence. This paradigm shift is enabled through advanced tools like Picarro's Advanced Mobile Leak Detection (AMLD) platform and its cloud-based analytics engine, P-Cubed® as detailed in Figure 2. Together, these tools enable operators to transition from reactive intervention to proactive, data-driven decision-making.

By moving beyond isolated leak detection to a comprehensive view of network health, operators can identify patterns, predict future risks, and optimize resource allocation. This shift not only improves operational efficiency but also strengthens environmental stewardship and regulatory compliance.

How Network Intelligence Increases Asset Value

Picarro's solutions empower operators to derive measurable value from their network intelligence:

Prioritization of Resources: By quantifying methane emissions and assessing leak severity, operators can prioritize repairs that maximize environmental and safety benefits. For example, focusing on large leaks can significantly reduce overall emissions and system risk while conserving repair budgets.

Strategic Asset Management: Actionable insights at both local and network scales allow for improved allocation of maintenance budgets and operational efforts. This includes identifying high-risk areas, optimizing pipeline replacement schedules, and streamlining compliance reporting.

Enhanced Decision-Making: Data-driven analytics empower stakeholders to make informed decisions that balance safety, compliance, and cost-effectiveness.

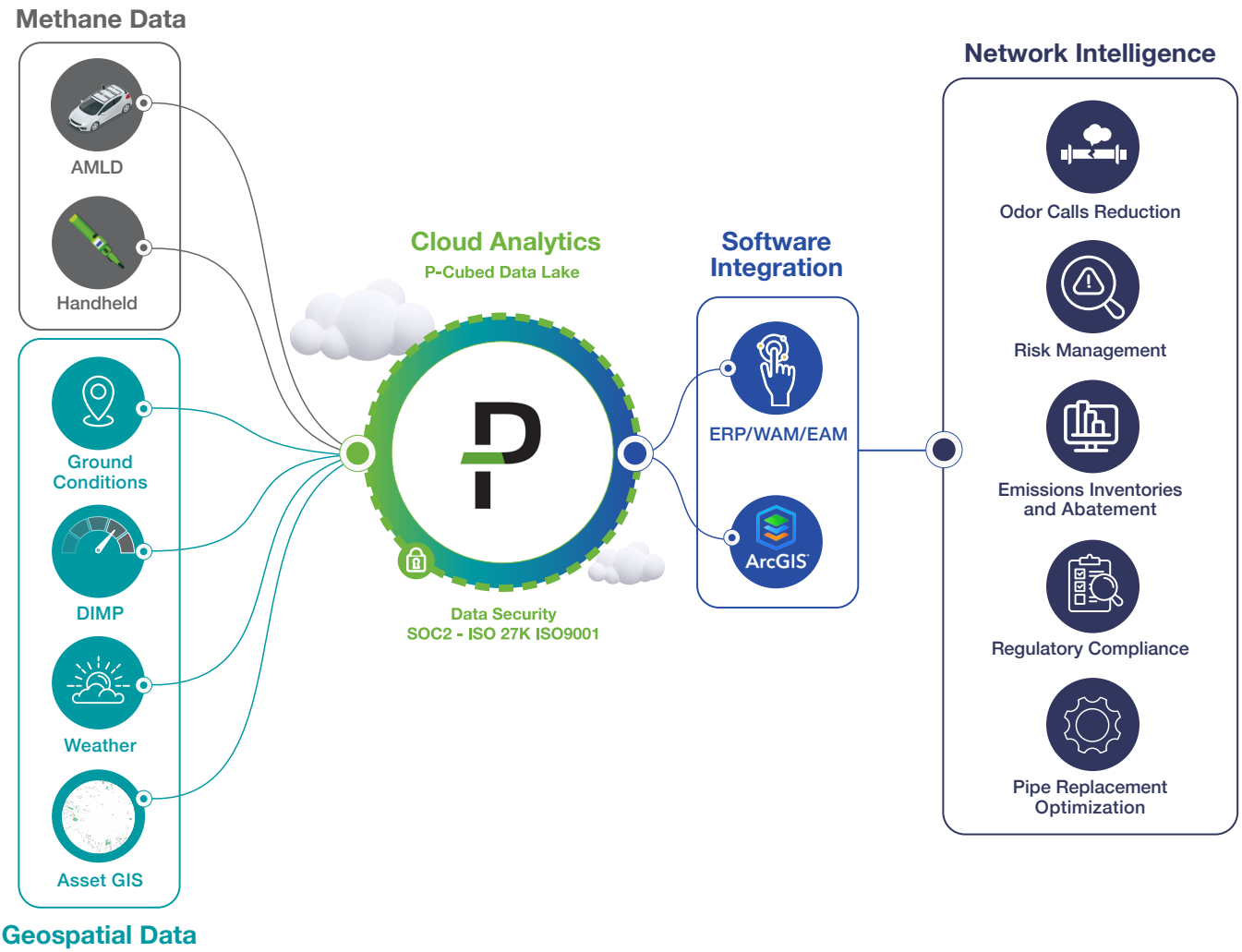

Figure 2. Picarro's End to End Solution: An integrated system combining data collection, geospatial context, and cloud analytics to deliver network intelligence for emissions reduction, compliance, and asset optimization.

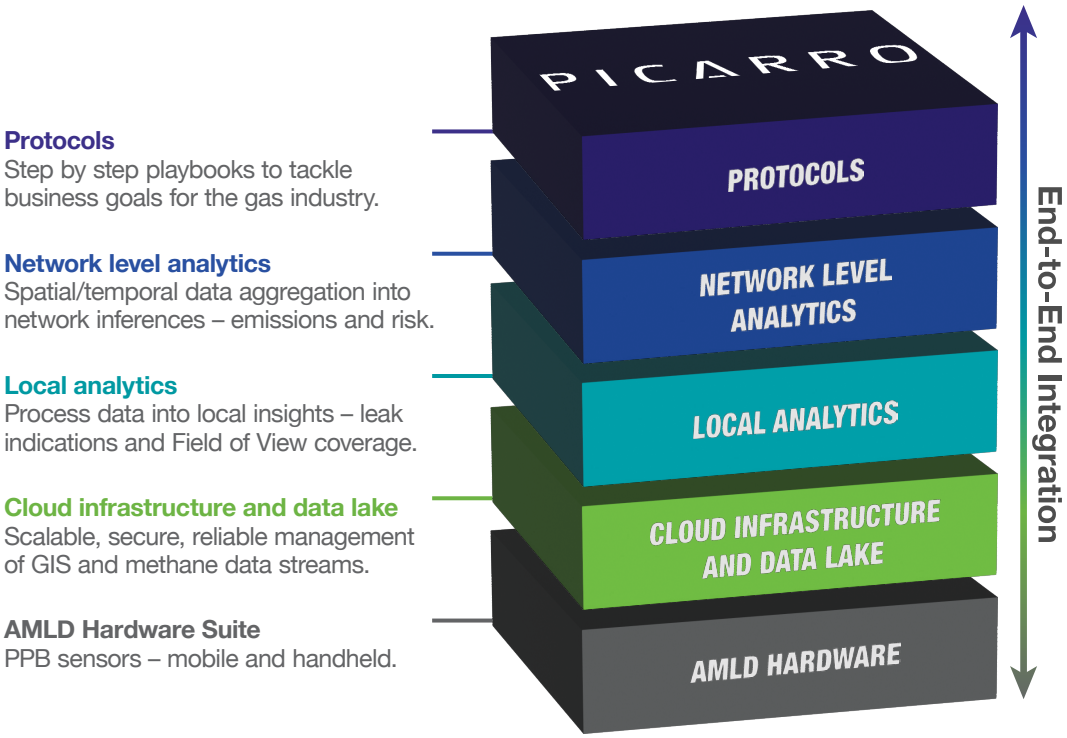

Figure 3. The Picarro Solution Stack: A fully integrated platform—from AMLD hardware suite to analytics and protocols—designed to transform raw emissions data into actionable insights and business outcomes.

Regulatory and Stakeholder Confidence: Transparent and defensible data reporting builds trust among regulators, investors, and the broader public. Operators can demonstrate progress toward emissions reduction goals with precision and credibility.

Picarro's end-to-end solutions provide the transparency, accuracy, and actionable insights needed to prioritize repairs, reduce emissions, and optimize operational efficiency.

Fully Integrated Solutions Create Actionable Insights

Picarro's end-to-end solutions are designed for seamless integration across all phases of network management. From vehicle-mounted AMLD systems to handheld detection devices, the entire stack ensures:

Unified Data Streams: All methane and environmental data are securely captured and stored in the P-Cubed® platform, ensuring consistency and transparency. This eliminates data silos and facilitates cross-departmental collaboration.

Real-Time Analytics: Advanced algorithms transform raw data into actionable insights, providing operators with the information needed to address the most important issues and act strategically.

Operational Flexibility: The modularity of Picarro's technology allows for customization to suit diverse operational environments, from urban pipelines to remote transmission lines. Operators can scale their monitoring efforts as needs evolve.

Picarro's system also integrates with existing enterprise software, such as GIS platforms and work order management tools, creating a streamlined workflow that enhances productivity and accountability.

Picarro's Solution Stack: A Closer Look

The Picarro solution stack operates in five integrated layers as detailed in Figure 3.

AMLD Hardware Suite: High-sensitivity methane/ethane sensors for vehicle-mounted and handheld systems. Specifically developed for the natural gas industry, these sensors provide unparalleled reliability and accuracy, detecting leaks with parts-per-billion sensitivity.

Cloud Infrastructure: Secure data lake for methane, wind, GPS, and GIS data, ensuring robust data integrity. This infrastructure supports scalability and real-time access to data.

Local Analytics: Real-time data processing to identify and prioritize leak indications. Local analytics enable operators to address issues as they arise, reducing downtime and operational risk.

Network-Level Analytics: Aggregated insights at the system level for emissions inventories, risk assessments, and asset optimization. These analytics help operators identify long-term trends, develop strategic plans and optimize maintenance to ensure the highest level for safety of the entire network.

Protocols: Tailored playbooks for emissions reduction, regulatory compliance, and safety management. These protocols provide operators with step-by-step guidance to achieve their operational goals.

Each layer of the solution stack is designed to work seamlessly with the others, creating a cohesive system that delivers actionable intelligence and measurable results.

Supporting Industry Transformation

Picarro's solutions align with leading emissions frameworks like OGMP2.0, the GTI-Veritas initiative, and the EU Methane Regulation, ensuring compliance and credibility. By shifting focus from individual leaks to system-wide emissions management, operators can:

Achieve Regulatory Compliance: Picarro's tools simplify the process of meeting complex regulatory requirements, providing automated reporting and auditable data trails.

Demonstrate Leadership in Sustainability: By adopting cutting-edge emissions management technologies, operators can position themselves as industry leaders in environmental responsibility.

Drive Innovation in Methane Emissions Management: Picarro's continuous investment in R&D ensures that operators have access to the latest advancements in leak detection and network intelligence.

Real-World Impact: Case Studies

Italgas:
Since adopting Picarro's solutions in 2018, Italgas has reduced odor calls by 50% and fugitive emissions by 83% compared to its 2015 baseline. These results highlight the value of integrating advanced analytics and proactive emissions management into daily operations. Italgas' use of network intelligence has also enhanced its ability to prioritize repairs, resulting in significant cost savings and safety improvements.

Pacific Gas and Electric (PG&E):
PG&E's adoption of Picarro's solutions contributed to more than 40% reduction in fugitive emissions. By leveraging network intelligence, PG&E achieved its emissions reduction goals two years ahead of schedule. This success underscores the power of integrating advanced analytics with proactive operational strategies.

Transitioning from traditional leak detection to holistic network intelligence is no longer optional—it is essential for operators to enhance safety, meet regulatory demands, and lead in environmental stewardship.

Conclusion

The natural gas industry is at a critical juncture. Transitioning from traditional leak detection to network intelligence is no longer optional—it is essential. Picarro's integrated solutions offer the tools and insights necessary to navigate this transformation successfully. By embracing a mindset shift, operators can enhance safety, meet regulatory demands, and lead the way in environmental stewardship.

For more information, visit **Picarro.com/gas**.

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