

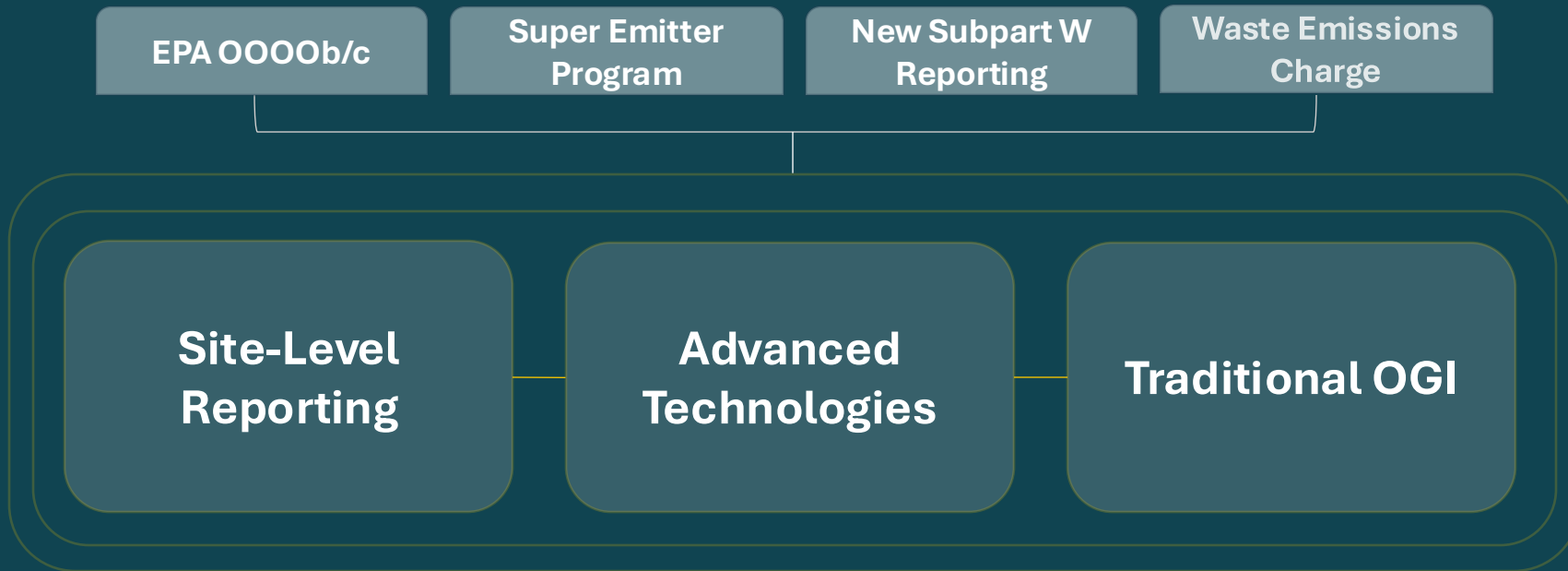


A TECHNOLOGY-DRIVEN APPROACH TO NEW METHANE REGULATIONS

DECEMBER 2024

PROJECT
CANARY

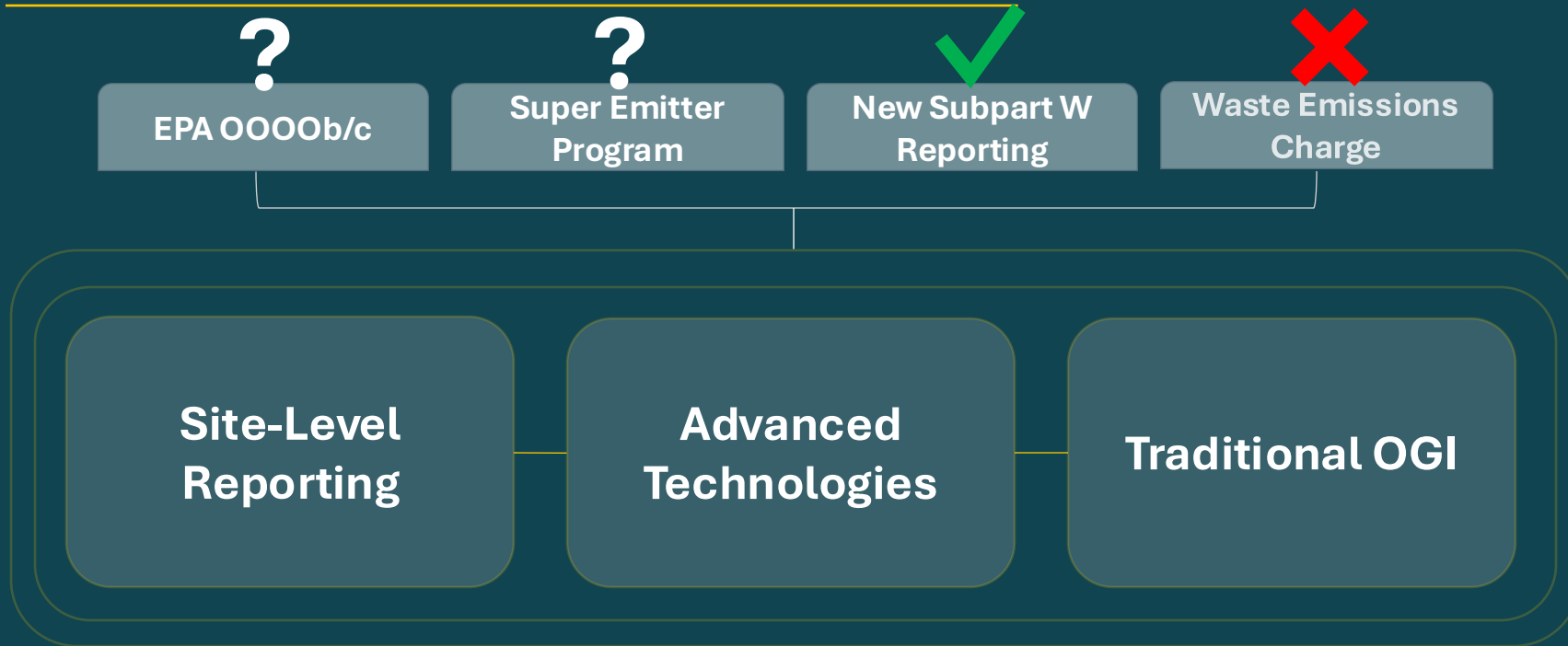
The Pre-Election Landscape



Previously Separate Worlds Are Colliding for the First Time



The Likely New Landscape



Heightened Transparency and Use of Technology Remain



UPDATES

Subpart W

- **Moves reporting to site level**
- **New and revised categories**
- Large leaks, known as **Other Large Release Events (OLRE)** >100kg/h will be individually tracked, measured, quantified

Incorporating more granular data with greater variety of measurement

APPLICATIONS OF THE DATA

Likely to remain intact for the next 1-2 years

- LNG import requirements
- Investors
- SEC disclosures
- AI Tech gas buyer demand



Current Steps for Super Emitter Program (SEP)

Approved entities look for SEP events utilizing approved technologies



Qualified leaks are discussed, verified



Locate/confirm the leak, report to the EPA



EPA works with operator to qualify it



Qualified leaks are posted to the EPA website

EPA 0000b

Super Emitter Program

If it goes away:

- Anyone can publish leaks they found
- No mechanism for correct attribution
- Other Large Release Events remain

NEWS ALERT | 2020

THE HILL

Major Oil Companies Oppose EPA Methane Rollback



IMPLICATIONS


So What Does This Mean?

- **Changes can and likely will occur rapidly**
- **There's no one-size-fits-all approach amidst regulatory uncertainty**
- **High value in flexibility to weave together new and changing measurement / inventories information**
- **A variety of data has overlapping and enhancing benefits**

Removal of quantifiable metrics makes risks more subjective



Understanding Multiscale Measurement-Informed Inventories



pubs.acs.org/est

Article

Toward Multiscale Measurement-Informed Methane Inventories: Reconciling Bottom-Up Site-Level Inventories with Top-Down Measurements Using Continuous Monitoring Systems

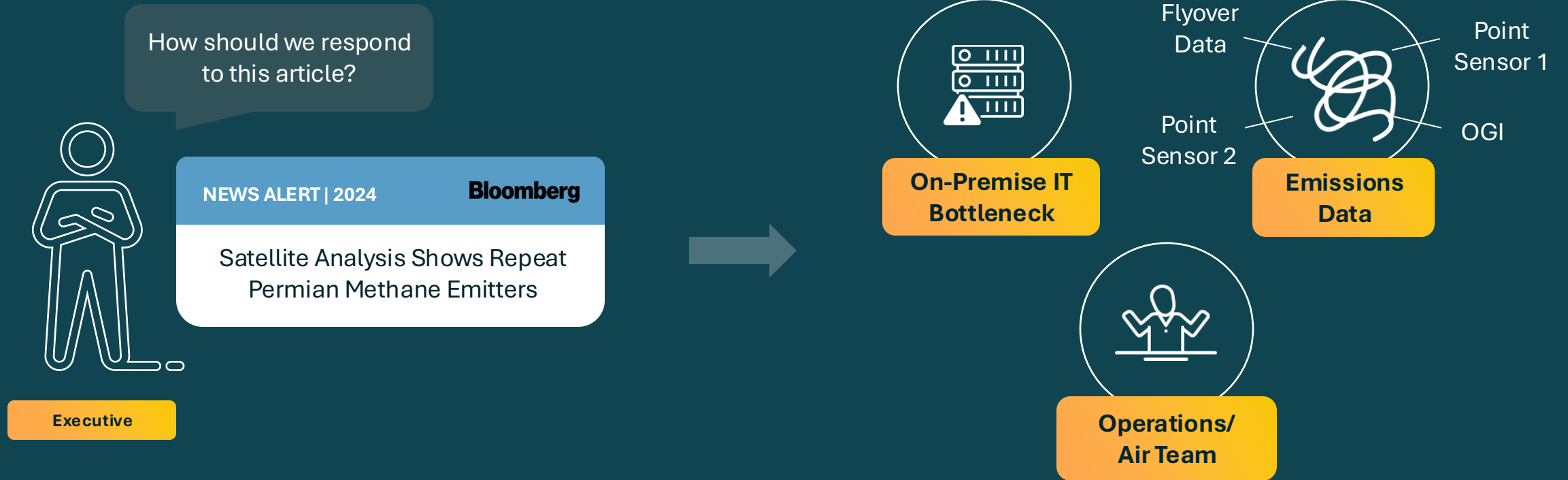
William S. Daniels,* Jiayang Lyra Wang, Arvind P. Ravikumar, Matthew Harrison, Selina A. Roman-White, Fiji C. George, and Dorit M. Hammerling

- Bringing in another form of data significantly reduces discrepancy
- Blending technologies solves for geographic coverage and measurement frequency

	Operator 1 Emissions (scf/hr)	Operator 2 Emissions (scf/hr)
Estimated Emissions	20	44
Top-down Avg. Emissions	508	726
Difference	25x	16.5x
Post-CMS adjustment	4.0x	1.8x



Managing Data Complexity



Bringing data together and responding is easy in theory, hard in practice.



Risk Management: Tailor Your Emissions Strategy like an Insurance Policy

**High Premium/
Low Deductible**

**Low Premium/
High Deductible**

Different Paths Based on Risk Tolerance, Exposure, and Flexibility



Emissions Data Management in Practice



**Bring together
complex data**



**Apply tailored
models & analytics**



**Deliver actionable,
reportable data**



Case Study: Reducing Emissions Risk Exposure

Challenge

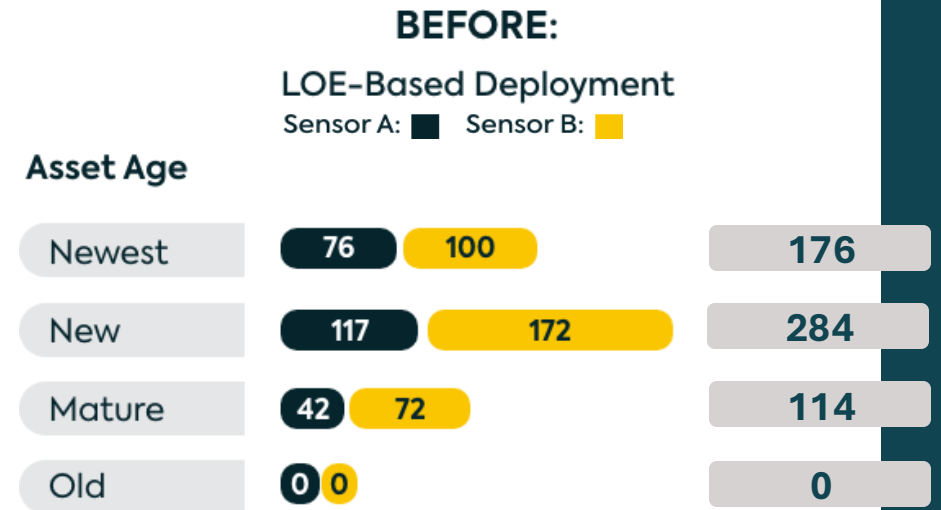
Company acquired new assets

Already partnered with 2 Continuous Monitoring vendors

Deployed monitors on highest-producing assets to lower cost/Mcfe

Optimize existing allocation of sensors to reduce emissions risk exposure

Sensor Allocation and Emissions Risk Before and After Project Canary Partnership



Higher Emissions Risk



Apply Tailored Models & Analytics for Actionable Insights

- Worked with the operator to collect periodic data across their asset base
- Looked at inherent site characteristics (design, maintenance cadence, etc.)
- Saw a high degree of variability from one batch of sites to another

Analyze & Identify Highest-Risk Sites

	0.0%	0.3%	0.3%	0.0%	
	0.2%	0.2%	0.7%	0.0%	
	0.8%	0.4%	0.8%	2.3%	
	0.0%	0.1%	1.2%	3.7%	
	0.0%	0.3%	1.6%	2.2%	
	0.0%	0.7%	2.0%	3.1%	
	0.0%	8.6%	1.7%	3.0%	0.0%
		2.7%	2.5%	3.5%	0.0%
			0.0%	5.2%	3.0%
			0.0%	10.1%	6.6%

Bringing data together showed where different technology yielded the highest ROI



Solution: Risk-Based Deployment

Solution

Risk-based deployment based on probability of Super Emitter risk

Impact

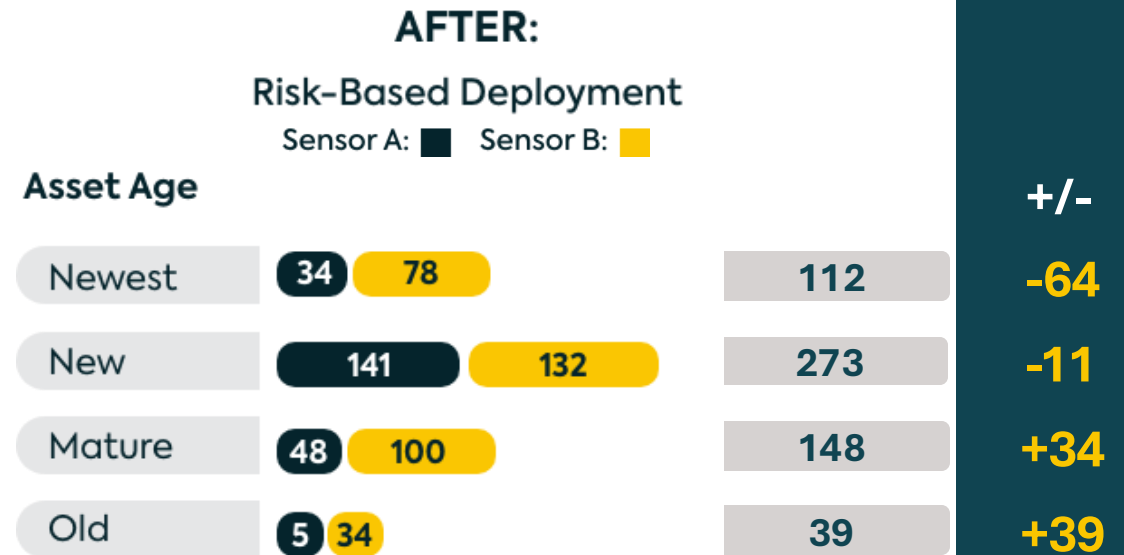
16x

ROI on measurement tech

27%

Projected reduction in Super Emitter risk

Sensor Allocation and Emissions Risk Before and After Project Canary Partnership

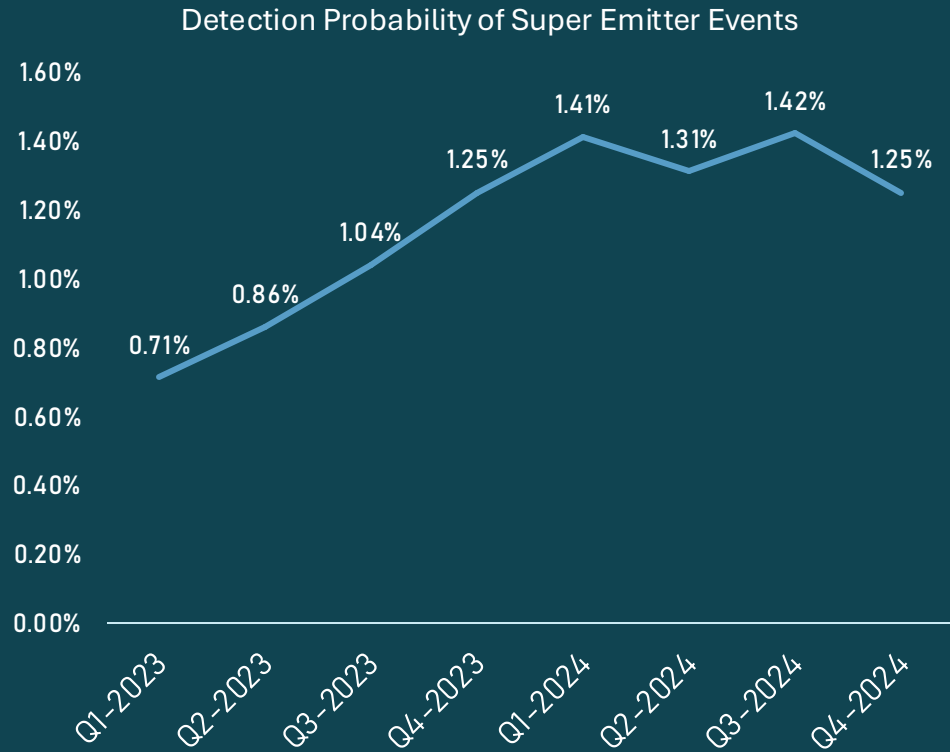


Lower Emissions Risk



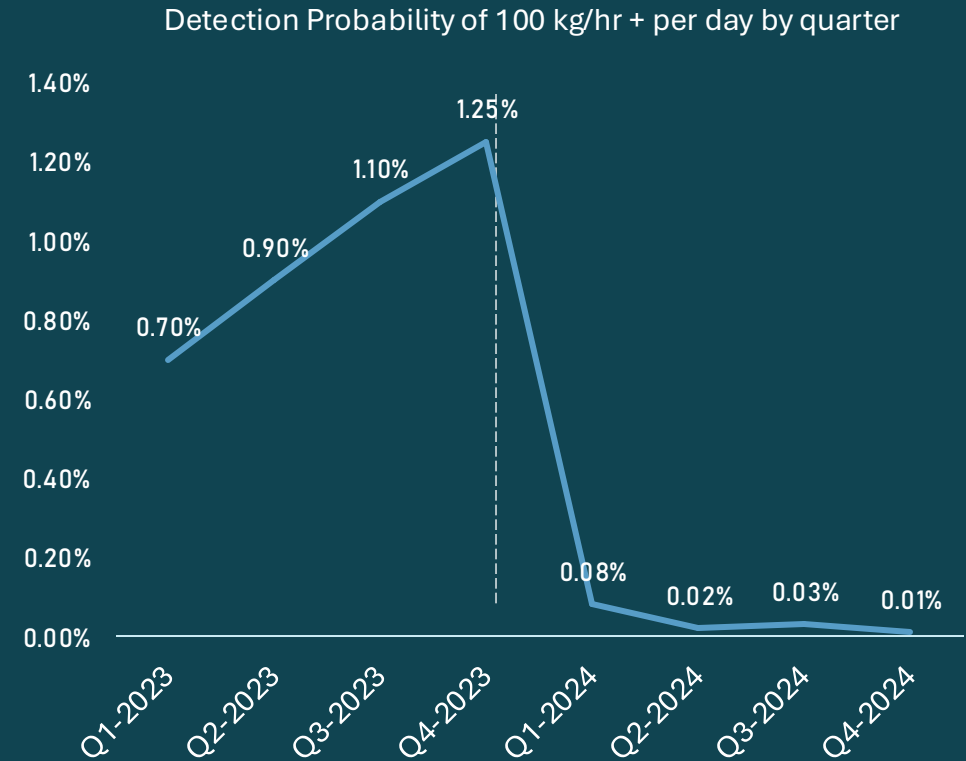
Super Emitter Leak Detection: Periodic Surveys vs. Continuous Monitoring

Periodic Surveys – Non-CEM sites



Risk profile unchanged

Continuous Monitoring – 100+ sites

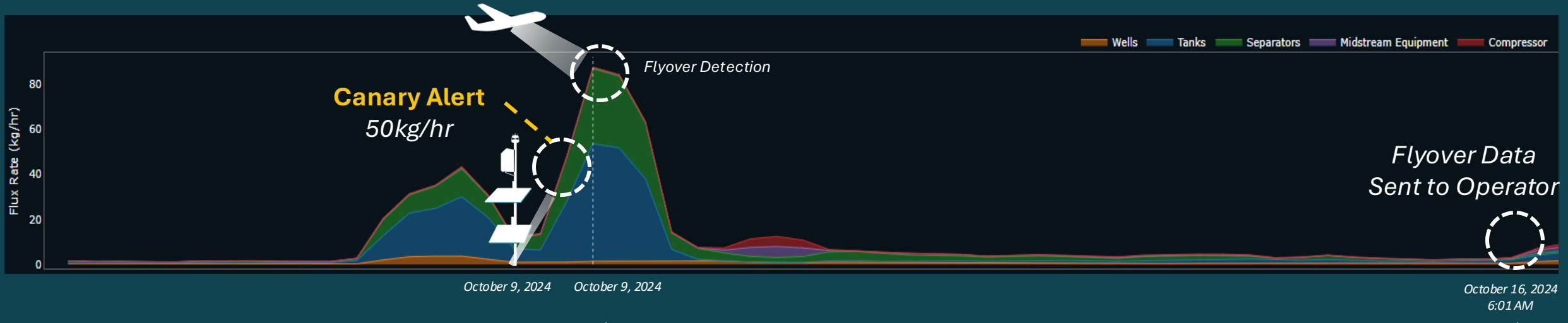


Risk profile drops dramatically



Layering Measurement Together Provides Maximum Site Coverage

Early CMS detection vs. potential notification lag time from flyover companies



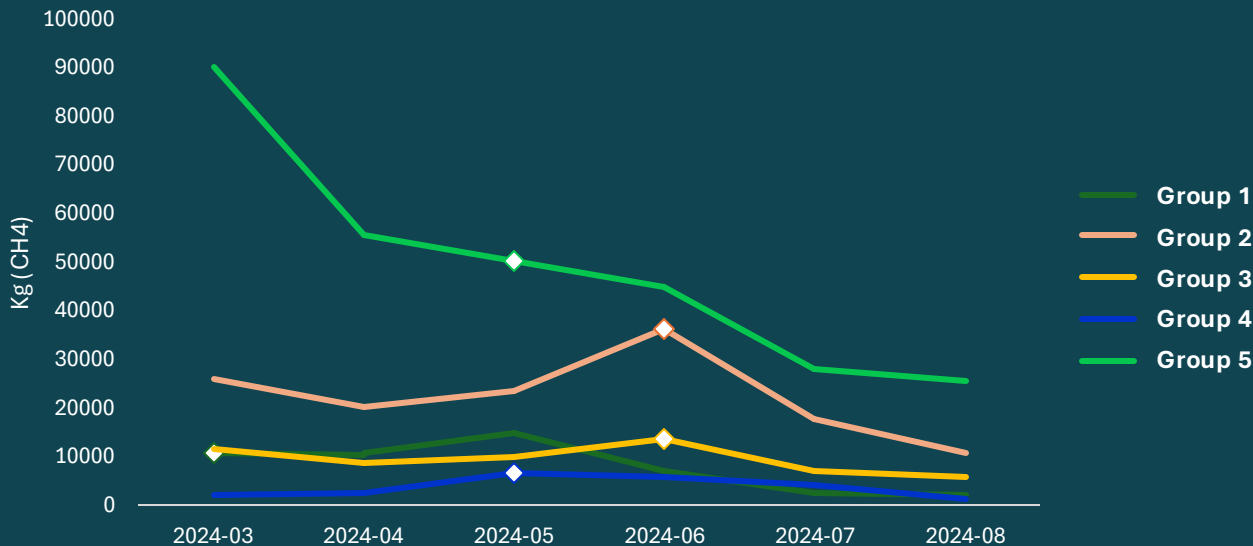
Multiple days



Engaging Field Teams to Drive Reductions, Speed to Action

Tailored alerting and field engagement on CEM sites leads to swift action

Total Methane (CH4) by Operational Group



Operational Group	Emission Reductions (%)
Group 1	(78%)
Group 2	(70%)
Group 3	(58%)
Group 5	(85%)
Group 5	(50%)

Overall 68% reduction in emissions on sites with field tech engagement



Takeaways

- **Without flyover data**, we wouldn't definitively know where greater risk lies
 - **Without CEM**, far more difficult to link up root cause and respond quickly
-



Project Canary: End-to-End Emissions Management

Methane Measurement



BRINGING TOGETHER ALL OF YOUR EMISSIONS DATA

Carbon Accounting



AUTOMATING YOUR SUBPART W REPORTING



PREPARING FOR THE FUTURE

Questions for Your Teams

1. How would you force rank the outcome you care most about?

Reputation

SEP Compliance Risk

Simplified Reporting

OGMP 2.0 Compliance/Voluntary Initiatives

2. How does your emissions risk profile **vary across assets**?

3. How are you getting **leak detection data** to your teams as quickly as possible?

4. How can you scale site-level inventories without relying on expensive consultants?



THANK YOU

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