Impact of Methane on Natural gas and data quality

pioneering methane certified gas

SETTING THE STANDARD FOR METHANE EMISSIONS

WHY OIL & GAS METHANE EMISSIONS?

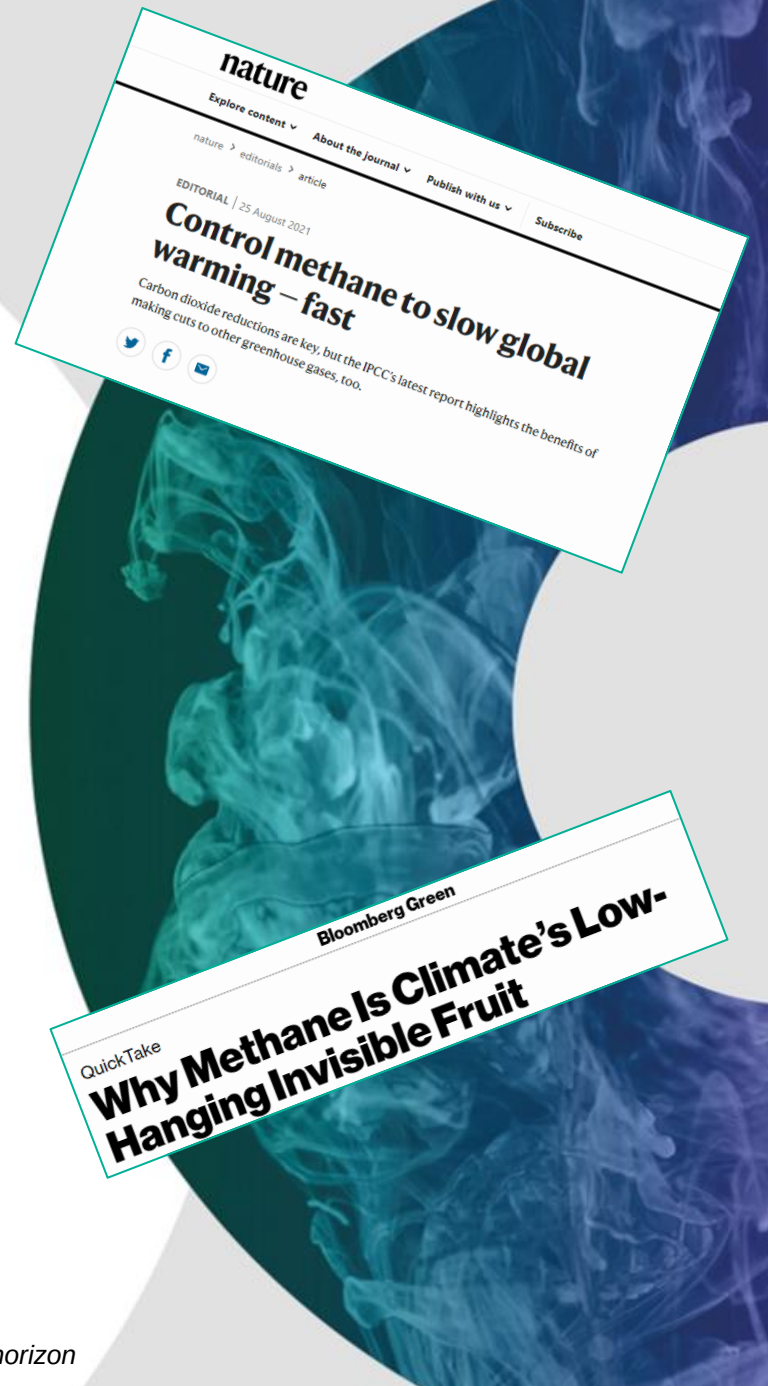
THE PROBLEM

- Methane is 82-86 times* more potent than CO_2
- Methane leakage rates range from 0-10%
- Global oil and gas methane emissions equate to **all** on-road vehicle emissions
- Reducing methane emissions to 0.2% by 2030 is the equivalent of taking 1.2 billion cars of the road

THE GOOD NEWS

- More than 50% can be mitigated **at net negative cost** with today's technology
- Why has this not happened?
- How can we move forward today?

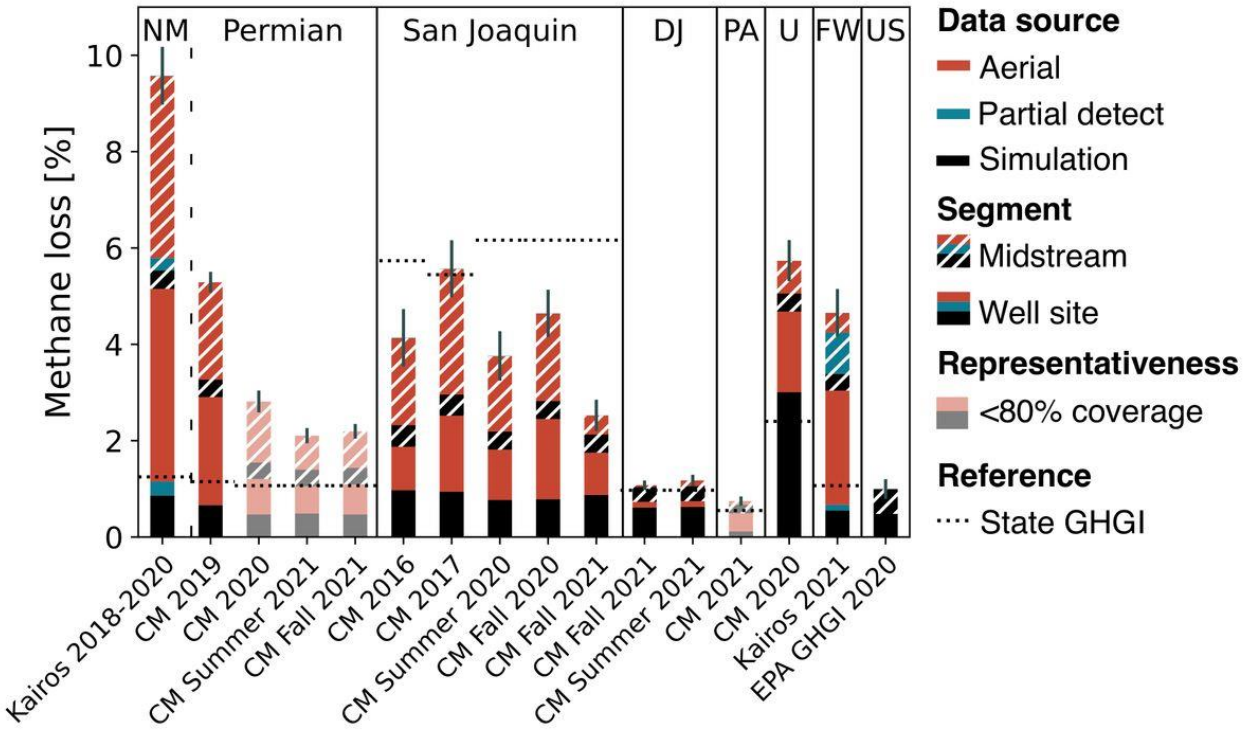
** GWP on a 20-year horizon*



SETTING THE STANDARD FOR METHANE EMISSIONS

THE PROBLEM WITH METHANE QUANTIFICATION

- Methane inventories (US GHGRP, GHGI, UNFCCC) inherently undercount when it comes to oil and gas
    - Most divergence comes from “unintended emissions” such as leaks or abnormal operating conditions
    - Perfectly QA/QC’d activity data doesn’t help



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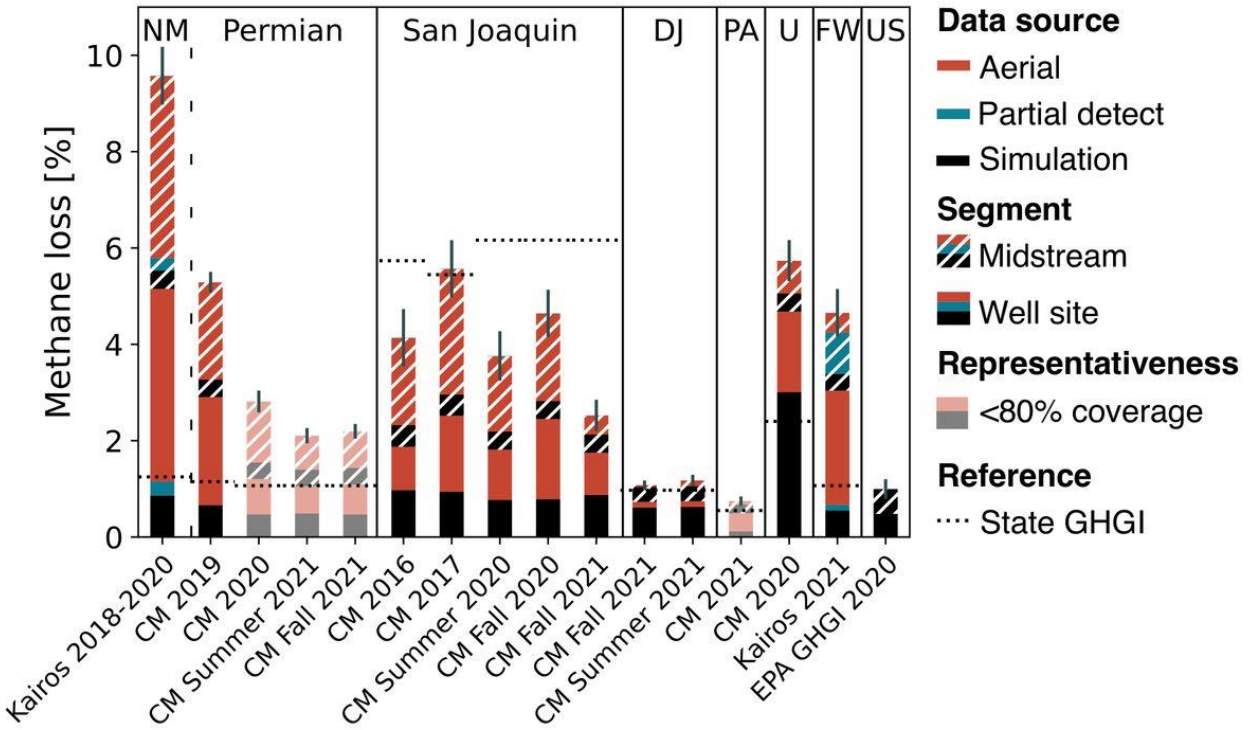
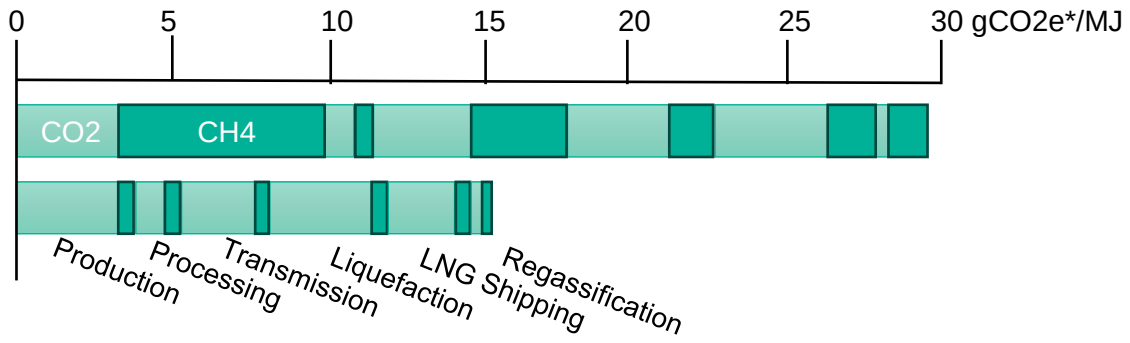
  - Most divergence comes from “unintended emissions” such as leaks or abnormal operating conditions
  - Perfectly QA/QC’d activity data doesn’t help
- Measurement protocols in the works but stochastic emissions are hard to characterize in a standardized or repeatable way
  - Different standards, different monitoring solutions yield different results
  - Silver bullet to reconcile “top-down and bottom-up” inventories
  - Impact of measurement on lifecycle emissions or differentiation is questionable
- MiQ’s approach:
  - “potential to emit” is weighted just as highly as quantification
  - Grade bands to support differentiation and recognize uncertainty





*100yr GWP for CH4

THE MiQ STANDARD

1

Calculated **Intensity**

$$= \frac{\text{Methane emitted (gas allocated)}}{\text{Natural gas throughput}}$$

2

Extensive **Monitoring Technology Deployment** on Facility- and Source-Level

3

Company Practices Policies and procedures for methane emissions management

Third-party accredited Auditors: audit, verify and report

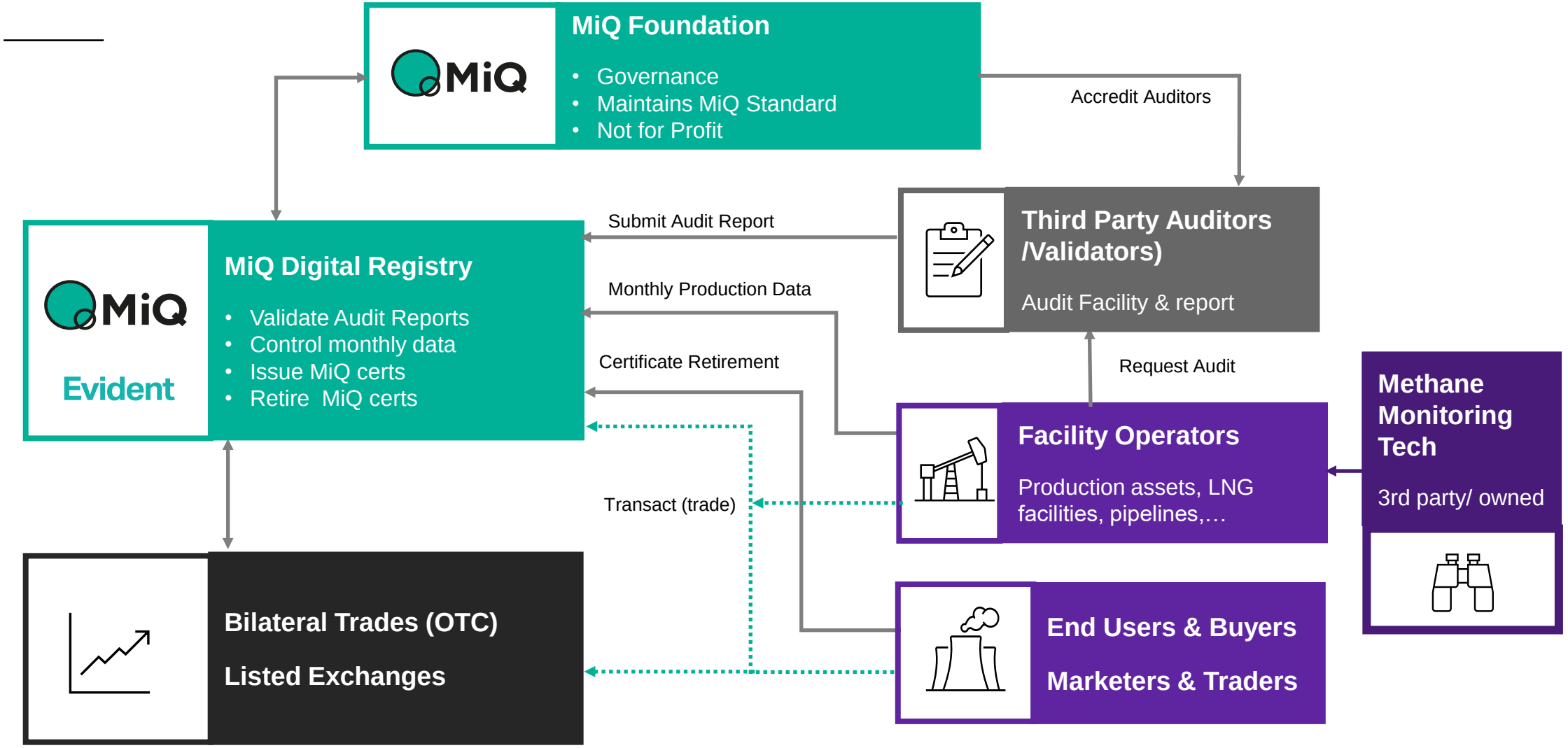
	gCH_4/MMBtu			
≤ 0.050%	10	Quarterly	Stringent	**A**
≤ 0.10%	19	Tri-annually	High	**B**
≤ 0.20%	38	Semi-annually	Medium	**C**
≤ 0.50%	95	Annually*	Mandatory minimum	**D**
≤ 1.0%	190	Annually*	Mandatory minimum	**E**
≤ 2.0%	381	Annually*	Mandatory minimum	**F**

** Source-level only*

1. MiQ Standard is public and transparent, open for scrutiny. **No black box**
2. MiQ certifies at Facility, **not** Well – to avoid cherry picking accusations
3. MiQ Standard will evolve dynamically as methane **tech** improves. **Continuous monitoring** norms integrated
4. Central trusted authority: certificates held in **MiQ Digital Registry**

MiQ GOVERNANCE

KEY TENETS FROM BANKING/TRADING, FINANCIAL AUDIT OR SAFETY STANDARDS. SEGRATION OF DUTIES TO AVOID CONFLICT AND ENABLE COST COMPETITION



*Evident provides registry services for other green certificate programs, including International RECs.

MiQ GOVERNANCE

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SEGRATION OF DUTIES TO AVOID CONFLICT AND ENABLE COST COMPETITION

Third party auditors

- Require subject matter expertise
- Experience with GHG accounting
- Experience with methane management in operations
- Experience with monitoring technologies
- Accredited by MiQ
- Open to any group with minimum criteria
- Yearly training and experience sharing
- Independent of data (can’t audit their own data)

MiQ GOVERNANCE

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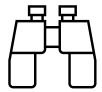
Monitoring Technologies

- No silver bullet
- Variable temporal and spatial coverage target different emission types
- Monitoring and Quantification capabilities must be demonstrated and validated through single blind controlled release testing with 3rd party oversight
- Data must be validated by auditor
- All monitoring results must be incorporated into methane inventory

Methane Monitoring Tech

3rd party/ owned



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DATA QUALITY INDICATORS

Concept attributed to Life Cycle Assessments:

ISO 14040, 14044

Asset-level Certification with goal of supporting Well-to-Gate Life Cycle Inventory

DQI's

- Time-related coverage
- Geographical coverage
- Technology coverage
- Precision
- Completeness
- Representativeness
- Consistency
- Reproducibility

Methane Measurement Technologies