EPA Cheatsheet

A Summary of EPA OOOO b/c, Appendix K & Subpart W

Version 1.6— August 2023

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Preface: EPA Cheat Sheet


EPA United States Environmental Protection Agency

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Controlling Air Pollution from the Oil and Natural Gas Industry

CONTAC

EPA Issues Supplemental Proposal to Reduce Methane and Other Harmful Pollution from Oil and Natural Gas Operations

November 11, 2022 -- EPA is proposing to update, strengthen and expand its November 2021 proposal that would secure major climate and health benefits for all Americans by reducing

Overview

On November 8, 2022, the EPA released an update of their new air regulations called EPA OOOO b/c and Appendix K.

What's Inside:

Each section has a summary chart (aka "cheat sheet") so you can quickly scan the new requirements and see the differences between the current & new regulations.

DISCLAIMER: CleanConnect.ai is providing this information for educational purposes only. We're not attorneys. Our goal is to help operators understand the new rules and regulations.

This analysis has been composed from the following documents:

- Overview Fact Sheet (9 pages)
- Preamble (504 pgs)
- OOOOb (323 pgs)
- OOOOc (288 pgs)
- Appendix K (20 pgs)
- Inflation Reduction Act (274 pgs)
- EPA Comment Solicitation (20 pgs)
- Subpart W - 1-AUG-2023 update (521 pgs)
- CDPHE Regulation 7 (Sep-2023) (334 pgs)
- **Total: 2,293 pages**

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EPA Column Definitions

The following charts compare these current and future regulations:

1

OOOOa

Current EPA Regulation

This is the current regulation that governs LDAR inspections for sites that were constructed, modified, or reconstructed after 9/18/2015.

2

OOOOb

New Sites after 11/15/2021

This impacts any upstream and/or downstream facility that was constructed, modified or reconstructed after 11/15/2021.

3

OOOOc

Sites Built On Or Before 11/15/2021

This impacts any site put into production on or before 11/15/2021.

In short, every site is now covered by the same requirements as OOOOb.

4

CDPHE (CO) Regulation 7

Colorado Current Regulation

We included CDPHE Regulation 7 because it is considered to be the strictest oil & gas air regulations in the US.

Colorado is considered the “R&D” lab for the EPA. Many of the new OOOOb/c rules have already been in place in CO for years.

1. Comparing EPA OOOOa/b/c and CDPHE (CO) Regulation 7

Requirement	Current EPA OOOOa	Proposed EPA (OOOOb)	Proposed EPA (OOOOc)	Current CO Reg7 Rules
Well Sites	Well site producing >15BOE/day	Complex Site (site w/more than one wellhead)	Complex Site (site w/more than one wellhead)	>12 tpy VOCs within 1000' occupied area
LDAR Frequency:	Semiannual	Quarterly	Quarterly	Monthly
Pre-production through completion	N/A	Recover gas & liquids during pre-production. Separator required.	N/A	Continuous VOC monitoring through 6-months of production
Repair	1st attempt within 30-days of detection. Final repair within 30-days of 1st attempt at repair.	1st attempt within 30-days of detection. Final repair within 30-days of 1st repair.	1st attempt within 30-days of detection. Final repair within 30-days of 1st repair.	1st attempt within 5 days of detection. Final repair within 30 days.
BSER (Best system of emission reduction)	Method21 or OGI	OGI or Method21	OGI or Method21	OGI or Method21
OGI Camera Specifications	60 g/hr; half methane/half propane; 10,000 PPM; 1/4 in orifice	60 g/hr; half methane/half propane; 10,000 PPM; 1/4 in orifice	60 g/hr; half methane/half propane; 10,000 PPM; 1/4 in orifice	EPA OOOOa definition
Super-emitter event	n/a	100kg/hour methane. Fix within 10-days. Report root cause on public website	100kg/hour methane, Fix within 10-days. Report root cause on a public website.	Will be implemented through the SIP
Compression Station Frequency	Quarterly	Quarterly	Quarterly	Quarterly[1]

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1. Comparing EPA OOOOa/b/c and CDPHE (CO) Regulation 7 (cont.)

Requirement	Current EPA OOOOa	Proposed EPA (OOOOb)[1] (Post 11/15/2021)	Proposed EPA (OOOOc)[1] (Pre 11/15/2021)	Current CO Reg7 Rules[2]
Centrifugal compressors (Centralized production facility)	None	95% control of emissions from wet/dry seal degassing. Test annually.	95% control of emissions from wet/dry seal degassing. Test annually.	EPA OOOOa
Reciprocating Compressors (Centralized Production Facility)	None	Test annually to determine rod packing leak rate. Replace rod packing if leaking >2scf/minute.	Test annually to determine rod packing leak rate. Replace rod packing if leaking >2scf/minute.	EPA OOOOa
Gas Processing Plant Frequency	Reference Subpart VVa (non-OGI)	OGI bi-monthly according to Appendix K	OGI bi-monthly according to Appendix K	EPA OOOOa
Gas Processing Plant Repair	Reference Subpart VVa (non-OGI)	1st attempt within 5-days, final within 15-days of detection	1st attempt within 5-days, final within 15-days of detection	EPA OOOOa
Zero-emitting pneumatic controllers & pumps[5]	Required for natural gas processing plants	Zero-emitting devices at new facilities	Replace natgas-pneumatics with zero-emitting devices	New >= 2/14/23 non-emitting Existing <2/14/23 meet low-bleed standards
Liquid Unloading (i.e. blowdowns)	N/A	Zero-emission liquid unloading	Zero-emission liquid unloading	95% emission reduction
Tank (battery) monitoring	Maintain uncontrolled VOC emissions <4 tpy. If > 4tpy, apply controls w/ 95% reduction	Maintain uncontrolled emissions <14 tpy CH4. If > 14tpy CH4, apply controls w/ 95% reduction	Maintain uncontrolled emissions <14 tpy CH4. If > 14tpy CH4, apply controls w/ 95% reduction	Only open thief-hatch 2x/year. $49k fines for violations.
Flare & ECD Monitoring Combustor - Method 22	Storage tank applicable facilities Monthly Method22 inspection (look for smoke)	Capture gas or use 95% efficient combustor. Method 22 - Monthly visual inspection (look for smoke)	Capture gas or use 95% efficient combustor Method 22 - Quarterly visual inspection (look for smoke)	No open flares. Capture gas or use 95% efficient ECD. Weekly visual monitoring. Testing combustor efficiency every 5 yrs

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2. Super-Emitter Events

100 kg/hour emission event - notice and response regulation

1

Day 1:
Notice

Notice by 3rd-party

EPA is partnering with 3rd-party:

- Satellites that fly the US every day
- Planes
- Mobile detection

2

Day 5:
Detection

Find the fugitive emission

- Detect using OGI or Method 21.
- Determine the duration of the emission

3

Day 10:
Fix

Fix The Problem

- Cold venting – fines $37,500 x days since last LDAR
- Tanks PRV open
- Thief hatch opening
- Etc.

4

Day 25:
Report

Problem & Fix Public Posting

- Report to EPA within 15-days of fixing the problem
- If you can't prove that you're innocent, the super-emitter event report will be posted publicly on a new EPA super-emitter website

3. Appendix K – Process for Manual LDAR

With the Nov 2022 update, this *only* **applies to gas processing plants**. All others use previous EPA LDAR process

01

Inspection Process

Mandates field of view, dwell times minimums, 10-second recording times for leaks, 5-minute inspection overview recordings, and delta-T requirements.

02

Required LDAR Training

- **Senior operator** with 1400 hours of experience, including 40 hours in the past 12 months.
- **Junior operator** required 30-hours of training under supervision of Senior operator

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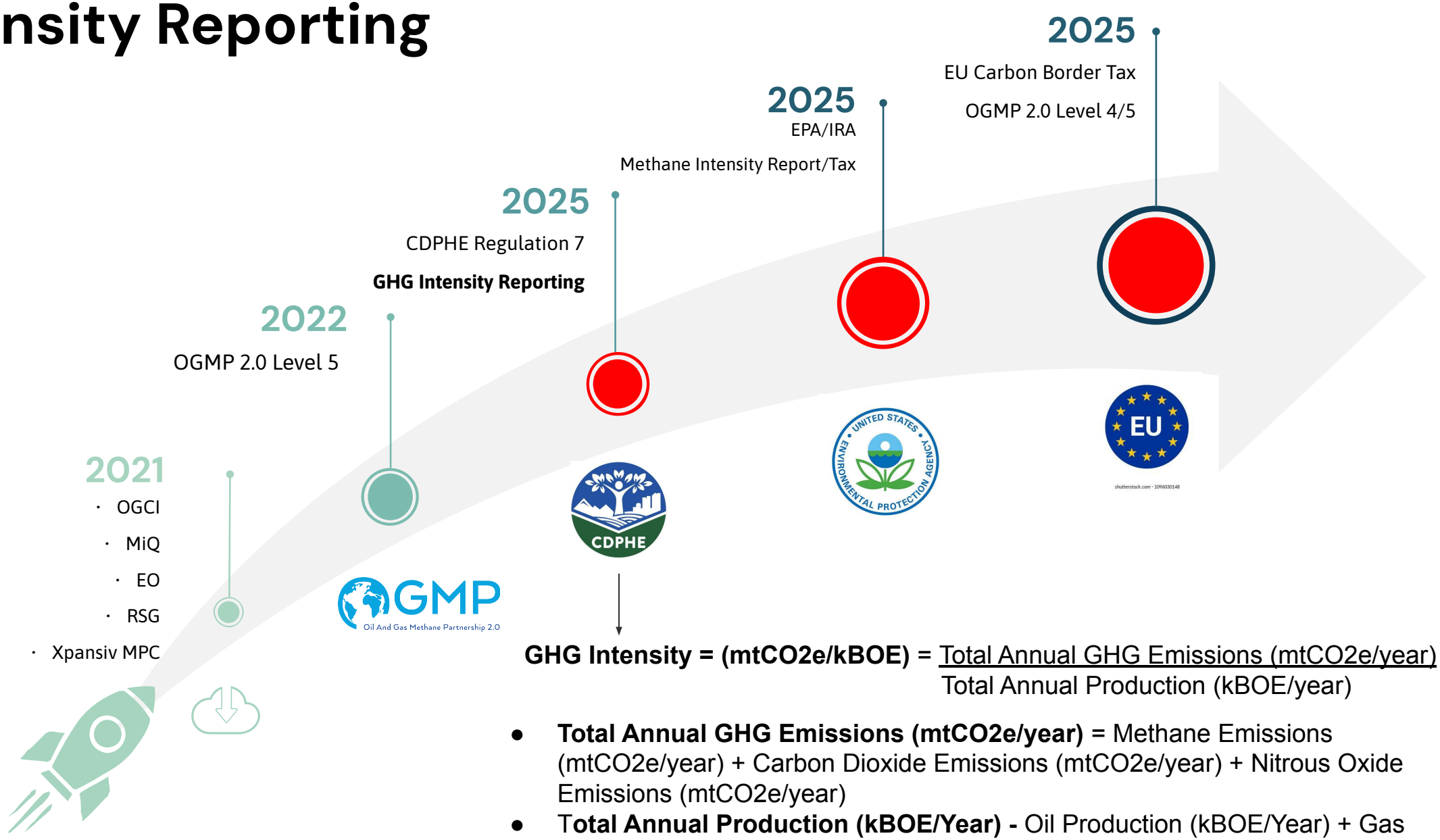
4. Mandatory GHG/Methane Intensity Reporting



GHG Intensity = (mtCO2e/kBOE) = Total Annual GHG Emissions (mtCO2e/year) / Total Annual Production (kBOE/year)

- **Total Annual GHG Emissions (mtCO2e/year)** = Methane Emissions (mtCO2e/year) + Carbon Dioxide Emissions (mtCO2e/year) + Nitrous Oxide Emissions (mtCO2e/year)
- **Total Annual Production (kBOE/Year) -** Oil Production (kBOE/Year) + Gas Production (kBOE/Year)

4.1 EPA Subpart W Emissions Inventory Changes

Enforcement Timeline — *Dates are Estimated

2022

Region-Level Emissions

Based on component emission factors defined at a region level:

(Estimated Emission Factors) x (Components)

2023

OOOO b/c + Subpart W drafts published

Late 2023*

OOOO b/c + Subpart W Finalized

The EPA will publishes the final OOOO b/c and Subpart W rules estimated November 2023.

Mid-2024

State Implementation Plans Submitted to EPA

All 50 states must submit their SIP (state implementation plan) to the EPA.

EPA Subpart W Finalized

Jan 2025

Source/Component Level Emissions

Empirical (IRA), bottom-up measured-informed inventory – source/component level emissions inventory **based on actual emissions.**

Mar 2026

Methane Tax Enforced

Methane tax is now in force **until ALL states implement SIP.**

- **Upstream 0.2% MI**
- **Midstream 0.11% MI**
- **Downstream 0.05% MI**

Jan 2027

All States Enforce OOOO b/c

All 50 states must enforce their OOOO b/c SIP by this date.

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4.2 Regulatory GHG/Methane Intensity Reporting

Feature	CO Regulation 7 GHG Intensity Reporting	Inflation Reduction Act	OGMP 2.0 Level 4/5 (EU Border Tax)
Prerequisite Compliance	CDPHE Regulation 7	Mandatory Reporting Rule Subpart W	Local Govt
Bottom-up emissions inventory factors (A1)	Subpart W – Component est. / equipment est.	Subpart W – Component est. / equipment est.	Level 3
Intensity measurement	GHG Intensity	Empirical Measurement	Methane Intensity
Baseline - Upstream	• 10.94 mtCO2e/kBOE GHG (2025) • 8.46 mtCO2e/kBOE (2027) • 6.80 mtCO2e/kBOE (2030)	0.2% CH4 intensity	0.2% CH4 intensity (OGCI numbers)
Baseline – Midstream Pipeline	TBD	0.11% CH4 intensity	0.11% CH4 intensity
Measured Bottom-up inventory (A2)	Source-level measured emissions	Source-level measured emissions	Source-level measured emissions Required for **Level 4**
Site-level (Top-down) measured	TBD	TBD	Source-level measured emissions Required for **Level 4**
Fee (tax) for not hitting baseline	GHG Fee (TBD)	• $900/mT CH4 • $1200/mT CH4 • $1,500/mT CH4	TBD. EU Border Tax
Fee calculated	(A1 or A2) / Throughput*Fee	TBD	TBD

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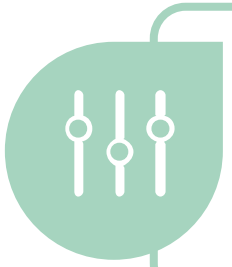
5. AMEL 2.0 (Similar to CO Alt-AIMM?)

Section §60.5399b of EPA OOOO b states there will be a new process for applying for an **Alternative Means of Emission Limitation** or AMEL. CleanConnect.ai autonomous LDAR was recently certified by Colorado as an alternative approved instrument monitoring method or Alt-AIMM, which required meeting these milestones.

Source-level Detection

Demonstrate visual source-level leak detection of emissions, including the ability to distinguish between fugitive and permitted emissions.



Blind Testing

Demonstrate detection performance with blind testing at various distances and leak sizes on a production facility.

Equivalency

Prove emissions reduction equivalency against current CO (Regulation 7) regulatory monthly LDAR requirements. CDPHE allowed LDAR-SIM or FEAST modeling.

Alt Work Practice

Provide an automated LDAR work practice that demonstrates how we detect, enable operators to diagnose and fix any problem found. Diagnosing and fixing leaks remotely is acceptable & encouraged.

Operator Endorsement

Colorado operators provided letters of support for the Alt-AIMM application and participated in actual production and field data collection that was included in the application.

EPA Approval

EPA has 270 days of receipt of the request and issue either an approval or disapproval in writing to the requestor. Scope is site, basin or wider applicability.

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6.1 Appendix K Manual OGI vs. Autonomous LDAR

EPA Requirement Appendix K	Manual LDAR using OGI	Autonomous LDAR using OGI
Use EPA OOOOa approved OGI camera	17 grams per hour (g/hr) and either butane emissions of 5.0 g/hr or propane emissions of 18 g/hr at a viewing distance of 2 meters and a delta-T of 5 °Celsius (C)	17 grams per hour (g/hr) and either butane emissions of 5.0 g/hr or propane emissions of 18 g/hr at a viewing distance of 2 meters and a delta-T of 5 °Celsius (C)
Check OGI camera functions	Turn it on. Verify its working.	Checked automatically every minute
Record LDAR plan for each site (Appendix K only)	Record 5-min video each day of dwell times, angles, distances, backgrounds, process, etc.	One-time setup of user-defined tour stops per site. Automated after
Record leak (store video for 5-years)	Capture 10-seconds of video, tag it for location, weather, leak source, etc.	Automatic
Record repair	In a repair work-flow	Automatic video recording. Integrated with LDAR repair workflow software - step2compliance.com
Repair	Manual, on-site	AI-assisted. Most repairs can be done remotely
Distance	Varies depending on environmental conditions and how steady a human can hold the camera. Practically speaking: 10-15 feet	Enhanced by fixed mounting 30-40 feet above ground, weather-resistant pan-tilt, longer-range lens, plus AI-enhanced imaging. Up to 120m was achieved in government-approved blind testing.
Detection limits	See a leak from multiple angles	Alt-AIMM approved detection matrix. 2.8kg/hr @ 120m, 0.2kg/hr @ 27m
Required source categories	Operator needs to manually inspect each required source category for every inspection.	Operator configures tour stops that meet both source categories & field-of-view requirements. This is a one-time setup. Its automated thereafter

6.1 Appendix K Manual OGI vs. Autonomous LDAR (cont.)

EPA Requirement Appendix K	Manual LDAR using OGI	Autonomous LDAR using OGI
Field of view	Divide complex scenes into manageable subsections. Each subsection must fill half the field of view of the camera	User-defined tour stops allow you to view at equipment group or equipment-level (source-level emissions monitoring)
Minimum time to dwell	2 seconds per component in the field of view (e.g., for a subsection with 5 components, the minimum dwell time would be 10 seconds)	User-defined. Typically 2-minutes per tour stop
Leak duration	Not required to determine	Duration is tracked across multiple pan-tilt tour stops. Multiple alerts available based on leak size, duration and source
Leak determination	Subjective, based on experience of operator	AI-Assisted. Periodically blind-tested for accuracy using government-approved testing criteria
Adjust for Delta-T	Move camera to best angle. FLIR GF320 does not have the ability to cycle through Delta-T presets.	Enhanced by fixed mounting OGI camera 30-40 feet above ground. Automatically adjusts for best Delta-T based on ambient temperature & image quality.
Required inspection breaks	Human operator must rest every 30-minutes	N/A; Inspections done 24/7
Required LDAR Reporting	Manual or 3rd party software	Hybrid LDAR report from Step2Compliance. Autonomous LDAR data is pulled automatically from CleanConnect.ai AI-enhanced visual logs
Training required	Senior operators have 1,400 survey hours during their career, including 40 hours in the past 12 months. Junior operators need 30 hours of onsite inspection under supervision prior to becoming an independent LDAR operator. Quarterly audits by senior operators.	Field personnel can be effective at diagnosing leaks remotely using AI-assisted visual alert system within 8-hours of training

Impacts of Regulation OOOOb/c

Many operators will need to invest heavily to maintain their manual LDAR program. OOOOb requires you to double the frequency and OOOOc requires you to inspect all of your sites built prior to 2021.

1

Staffing & Call-Out

The number of people and scheduled call-outs will increase dramatically. Literally millions of scheduled inspection will increase with corresponding safety and vehicle emissions.

2

Retrofits (OOOO c)

Replacing gas-powered pneumatics on every existing site will cost the industry millions of dollars and down-time.

3

Enforcement: Super-Emitter

Satellite technology will enable the EPA to monitor your sites 24x7x365 and 100 kg/hour leaks will be easy to spot.

4

Reporting: Methane Tax

The inflation reduction act introduces the concept of a methane tax. You can avoid it for now by complying with OOOO b/c for now, but you can expect a methane intensity tax in the future.

Learn How to Automate EPA Compliance and Avoid the Methane Tax.

Schedule a free discovery session and let us demonstrate how we help our clients automate compliance and operations using computer vision.

Click here to schedule a free strategy session:

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Customer Case Studies

We can walk you through strategies and options from operators like you who have automated EPA compliance.

Private Consultation

We can answer questions about the new EPA regulations and provide strategies & options you can use in you organization for compliance.

Autonomous LDAR

We can show you how Autonomous LDAR can be part of your solution using our government-certified autonomous LDAR platform.