



# Methane Abatement in the Oil and Gas Sector: Replace Natural Gas-Driven Equipment

This fact sheet presents findings for the replacement of natural gas driven pumps and controllers with electric or air driven alternatives from a broader study assessing the costs and financial implications of four methane abatement measures across nine countries in Africa and Latin America. Estimates of abatement potential and mitigation costs are developed at the country level, accounting for real-world constraints including existing policy frameworks, ease of deployment, and prevailing industry practices. The study aims to support regulators in designing appropriate incentives and policies to guide and prioritize the deployment of abatement technologies.



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FULL REPORT

The full report, published in June 2026, is available via the QR code.

## Overview

Natural gas-driven pneumatic devices are widely used in oil and gas operations to control and automate process equipment. These devices rely on pressurized natural gas to regulate flows, inject chemicals or actuate valves. In doing so, they intentionally release methane to the atmosphere or “bleed” emissions as part of normal operation. To reduce or eliminate methane releases, these devices can be replaced with instrument air systems (which use compressed air), electrically powered devices, or low- or no-bleed pneumatic devices.

This study assesses the replacement of natural gas-driven pneumatic controllers and pumps with (i) electric equipment or (ii) instrument air equipment (grid- or solar-powered). This replacement fully eliminates methane emission<sup>1</sup>.

## Costs range

The table below presents per-equipment costs associated with the two mitigation options considered for natural gas-driven pneumatic equipment.

\$/equipment	Capital Costs	Operating costs
Electric equipment	\$0 - \$25,000	<5% of CAPEX
Instrument air equipment	\$0 - \$20,000	<5% of CAPEX

*Cost estimates are indicative and may vary significantly depending on site conditions, local market conditions, labor and logistics costs, regulatory requirements, import fees, supply chain availability, and project-specific factors (e.g., scale, location, and existing infrastructure). This table does not include benefits (e.g., savings from avoided gas losses, gas sales, or avoided penalties).*

<sup>1</sup> United States Environmental Protection Agency. (2026). Instrument Air Controllers. Available at: <https://www.epa.gov/natural-gas-star-program/instrument-air-controllers>

## Current policies and practices

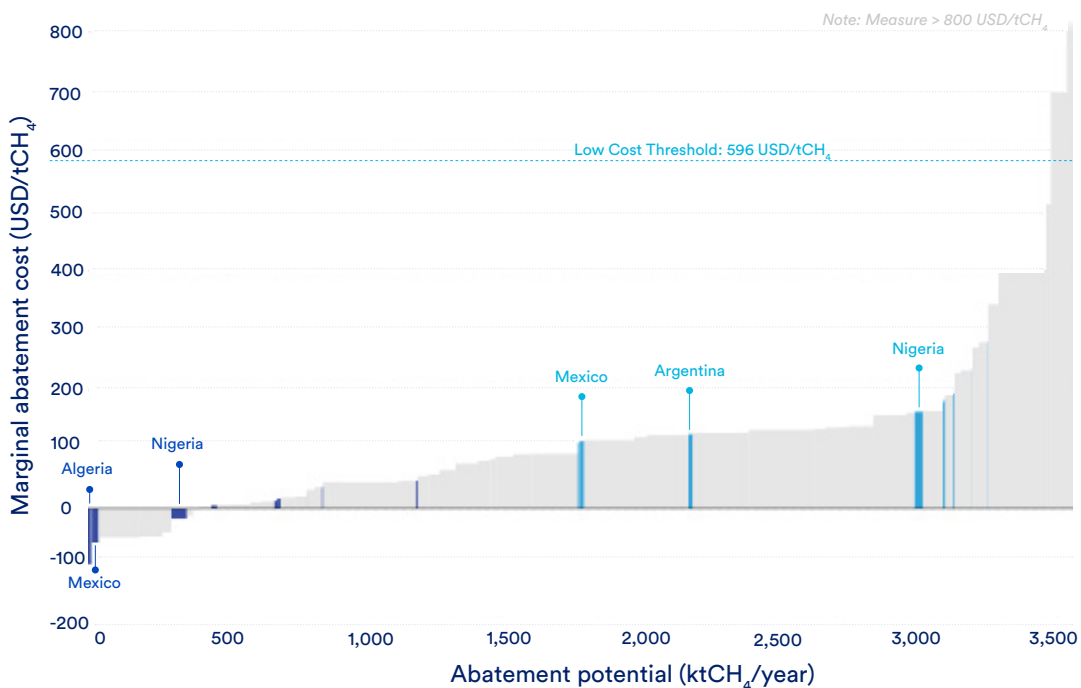
The table below presents the current status of regulatory frameworks and mitigation practices related to the use of electric or air driven pumps and controllers.

	Algeria	Angola	Argentina	Brazil	Egypt	Ghana	Libya	Mexico	Nigeria
Regulation in place	N	N	N	N	Y	Y	N	Y	Y
Current practices	H	M	H	H	H	M	H	M	M

Regulation ■ Y – Yes (National) ■ P – Partial (Subnational) ■ N – No  
 Practices ■ H – High adoption ■ M – Medium adoption ■ L – Low adoption

For further details, please refer to the individual country fact sheets.

### Marginal Abatement Cost Curve for Selected Mitigation Options



#### Abatement options

■ Instrument air equipment ■ Electric equipment ■ Other abatement options

Note: In this marginal abatement cost curve (MACC), abatement options are disaggregated by country and abatement options. Marginal abatement costs are aggregated at the country–technology level using a weighted average based on abatement potential, combining different segments (e.g. upstream, midstream) and locations (e.g. onshore, offshore).

Based on emissions data from International Energy Agency (2025) Methane Tracker Database - IEA; as modified by Carbon Limits/CATF

## Analysis

Methane emissions from pneumatic controllers are relatively low compared to other sources assessed (i.e., flaring, storage tanks and leaks), which reflects the two main contexts observed:

- Countries without targeted regulation, where operators retain flexibility and many assets already rely on electric or instrument air alternatives (e.g., Algeria, Argentina).
- Countries with restrictive regulation, where natural gas-driven equipment is banned (e.g., Nigeria) or strongly discouraged in favor of alternatives (e.g., Egypt, Mexico), has led to a widespread shift towards zero-bleed systems, particularly in new developments or major facility upgrades.

As a result, the remaining abatement potential is limited, given the already medium-to-high adoption levels observed across several of the assessed countries (e.g., Angola). However, the results of this study are still illustrative as they demonstrate the cost-effectiveness of this abatement option that can be pursued in other countries beyond the 9 considered in this study.

For the residual share of gas-driven pneumatic controllers, the marginal abatement cost of replacing gas-driven controllers with instrument air systems is well below the low-cost threshold of 596 USD/tCH<sub>4</sub> (20 USD/tCO<sub>2</sub>e) and can even be negative due to avoided gas losses. Replacements with electric systems also remain low cost overall but tend to have slightly higher marginal abatement costs than instrument air options, reflecting somewhat higher CAPEX and OPEX requirements.

## Challenges and barriers to wider deployment

For the residual share of gas-driven pneumatic controllers, key challenges to further deployment include:

- **Technical and operational constraints.** Retrofitting can be complex, particularly at aging facilities, due to space, safety, and integration constraints. Deployment may also be hindered by limited equipment availability and lack of technical familiarity. In addition, electric or instrument air systems depend on reliable power or compressed air infrastructure, which may be lacking in remote or offshore locations.
- **High retrofit costs and weak economic incentives.** Replacing existing systems requires upfront capital investment, with often limited financial returns, especially where gas has low or no commercial value or where methane pricing signals are weak, thereby slowing down replacement decisions.

*Disclaimer: The figures presented in this fact sheet are based on national-level estimated data and analytical assumptions from 2025. Actual emissions, abatement potential, and costs may vary due to data limitations, site specific conditions, operational constraints, and cost structures. This document is intended for informational purposes only and should not be relied upon as the sole basis for investment, operational, or policy decisions. Regulators are invited to reach out to CATF for further discussions on understanding the assumptions underlying the cost curves and for guidance on the adoption and implementation of methane regulation.*