Methane Abatement Costs in the Oil and Gas Industry: Survey and Synthesis

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Harvard Club of New York
September 25, 2025

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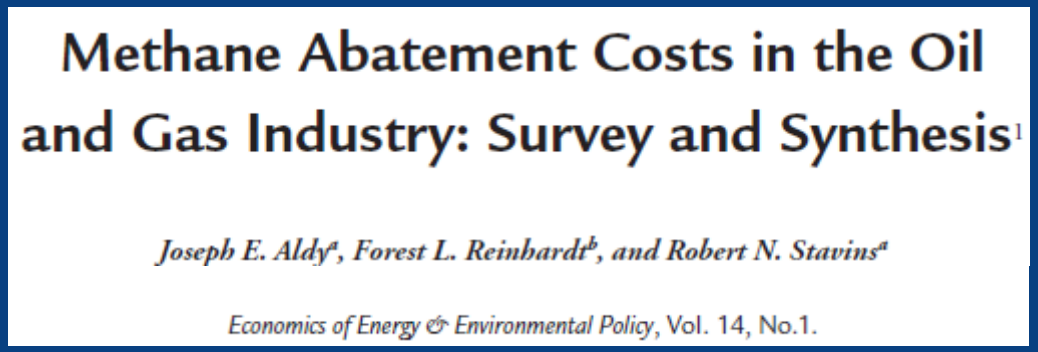
Methane Abatement Costs in the Oil and Gas Industry

- Methods for Estimating Abatement Costs
- Evidence of Abatement Costs
- Policy Implications and Next Steps


Methane Abatement Costs in the Oil and Gas Industry: Survey and Synthesis[1]

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Economics of Energy & Environmental Policy, Vol. 14, No.1.

Methods for Estimating Abatement Costs

Prospective Analysis: Engineering Cost Models

- Specify equipment and actions for a "model plant"
- Estimate bottom-up cost and emission reductions
  - Investment cost plus, operating cost, revenues
  - Revenues from marketing captured methane
- Prime Examples: U.S. EPA, International Energy Agency (IEA), Dunsky Climate & Energy Advisors (Dunsky)

Limitations of Engineering Models

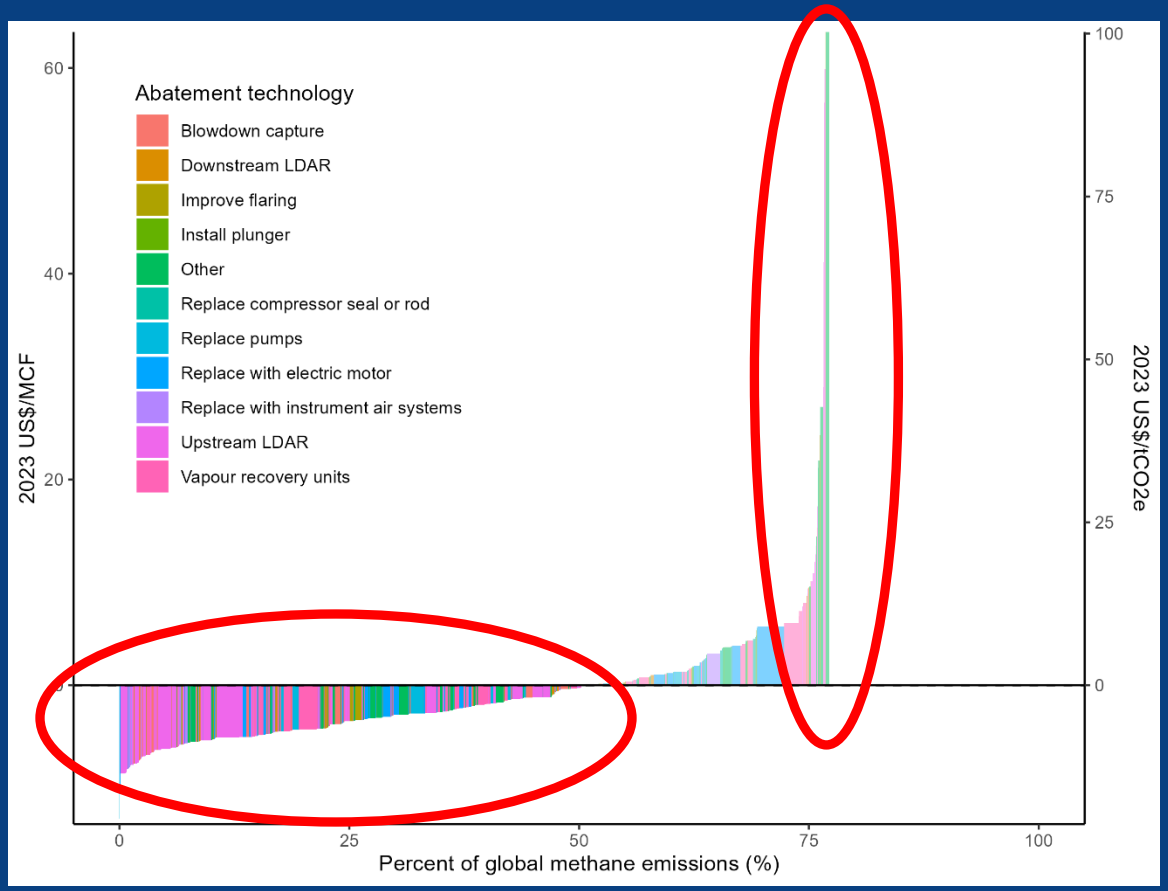
- Assume captured methane always marketable
- Often omit costs of detecting leaks before fixing
- Exclude management time/opportunity costs
- Most models build on common ICF foundation
- Average estimates mask firm-level heterogeneity

Retrospective Analysis: Econometric Models

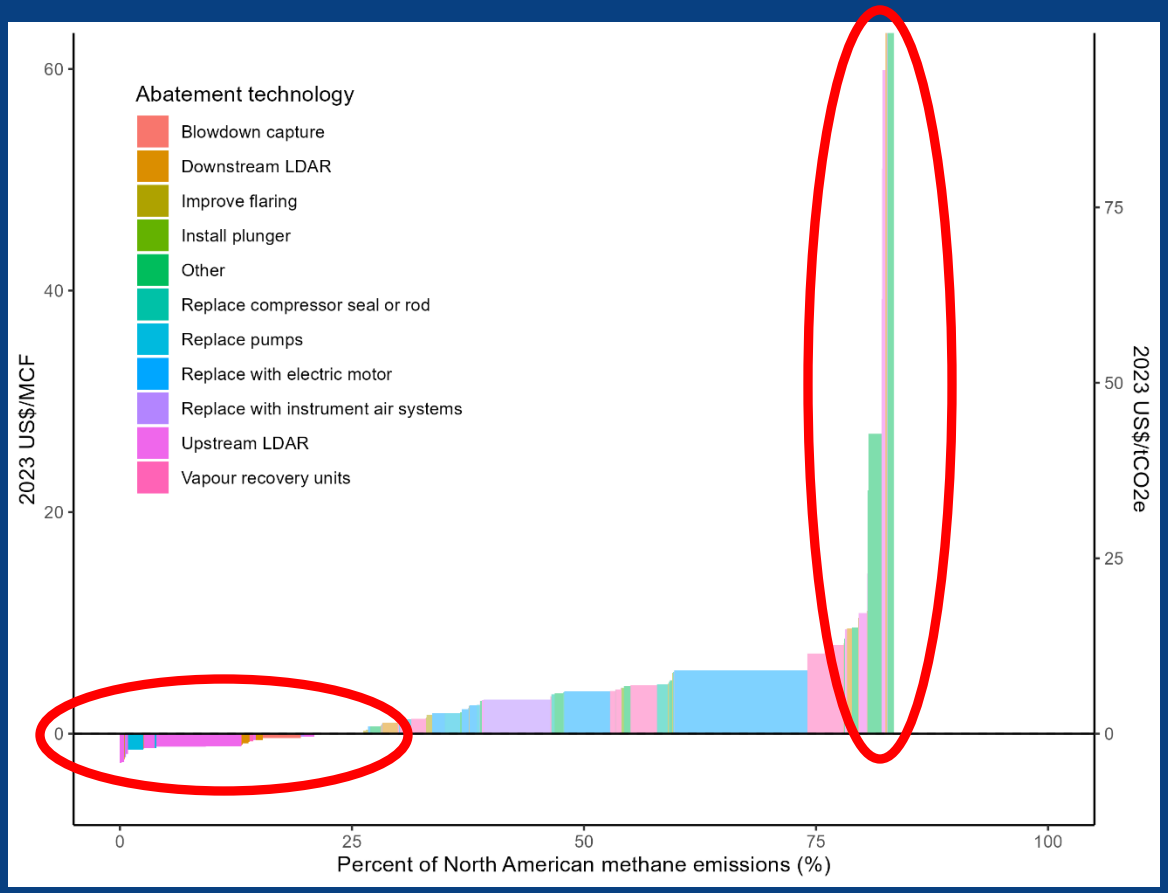
- Statistical model explaining how methane emissions vary with prices / policies
- Marks exploits variation in prices in local trading hubs and GHGRP methane data
- Lade and Rudik exploit variation in state policies
  - Couple with firm-specific engineering cost models

Evidence of Abatement Costs

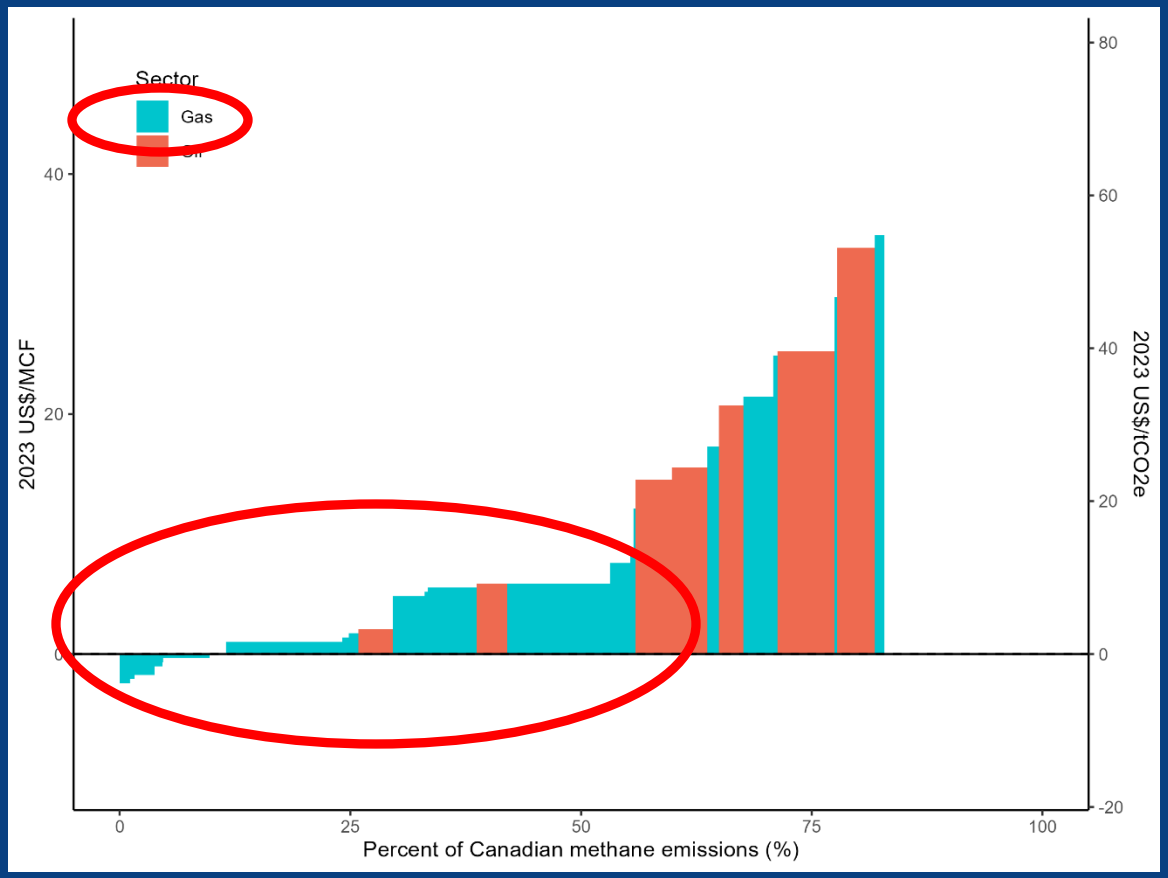
Global O&G Methane Abatement Opportunities, IEA



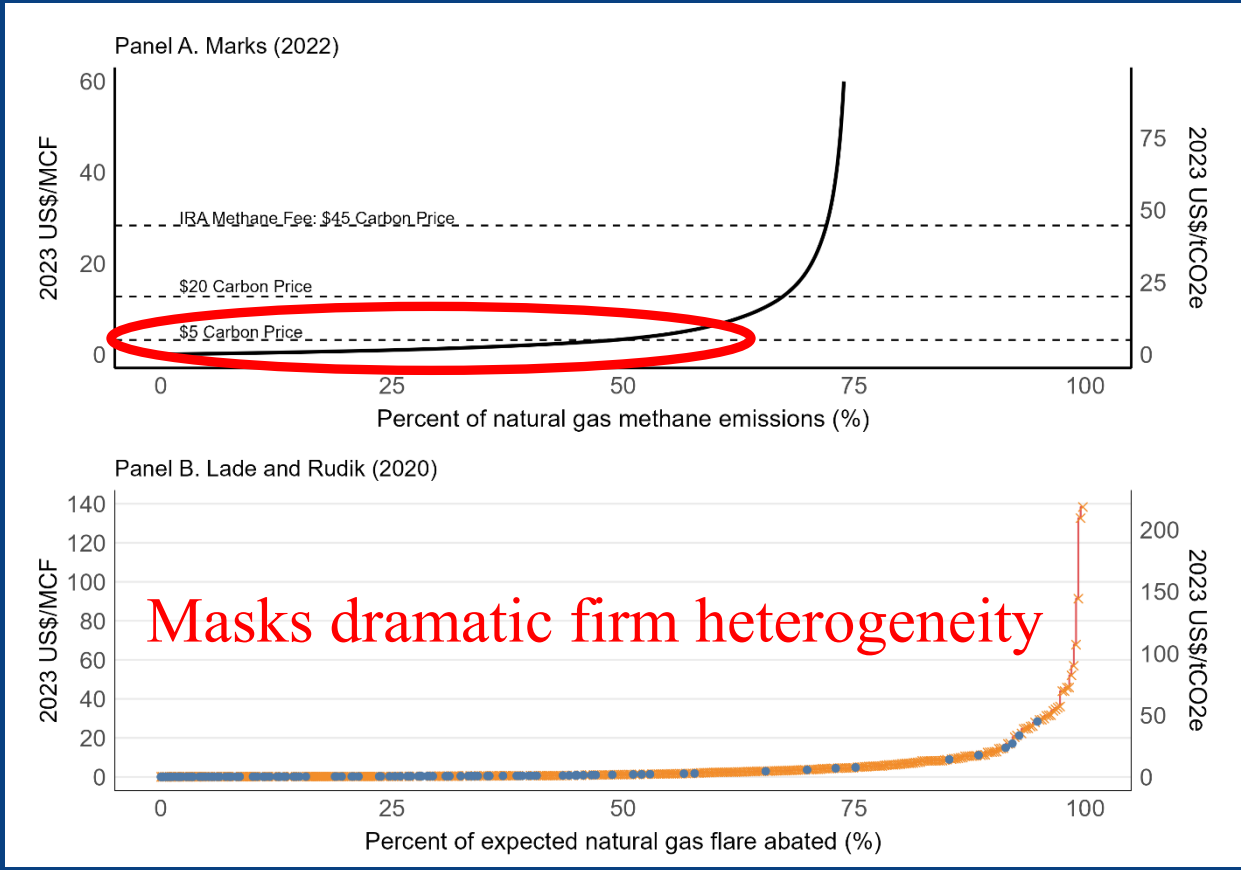
North American O&G Methane Abatement Opportunities, IEA



Canada O&G Methane Abatement Opportunities, Dunsky



U.S. O&G Methane Abatement Opportunities, Marks, Lade & Rudik



Average Abatement Costs ($/tCO$_2$e)

Analysis / Model	Region	Percentage Reduction	Average Cost ($/tCO$_2$e)
U.S. EPA	USA	80%	$12
IEA	N. America	80%	$11
Dunsky	Canada	80%	$12
Marks	USA (ex CO, ND)	60%	$6
Lade and Rudik	North Dakota	80%	$7

Policy Implications and Next Steps

Policy Implications

- Substantial low-cost methane abatement opportunities
- Negative-cost claims should be treated cautiously
- Costs escalate sharply beyond 60–80% reductions
- Remote sensing could shift costs downward

Policy Implications: Stringency of Emission Goals

- Marks: $60 million in net costs for 60% reduction
  vs. EPA: $1.5 billion for 80% reduction
- IEA: $1.3 billion in net costs for 74% reduction
  vs. IEA: $3.7 billion for 80% reduction
- Dunsky: raising abatement from 70 to 80% increases costs by two-thirds

Next Steps

- Expand Marks gas price model to continental U.S. with remote sensing methane emissions data
- Exploit state regulation and royalty variation to estimate marginal costs
- Examine within-firm learning in abatement

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