Converting Challenges into Opportunities: Software for Distributed Methane Abatement

California Air Resources Board
Symposium on Methane Emissions from Natural Gas Systems
Cap-Op Energy
Making Sustainability Profitable...

for California

• Objective:
  • Reduce carbon intensity of natural gas delivered to California

• Sector Requirements
  • Tools to streamline planning and implementation (MAP)
  • Site access and proven technologies
  • Robust quantification tools (DEEPP)
About Cap-Op Energy

Sustainability Made Profitable

Mission: To simplify sustainability in the energy sector with intelligent tools and strategic thinking.

Cap-Op Energy has developed the premier energy efficiency platform for the oil & gas industry to automate and standardize the quantification of greenhouse gas credits (carbon offsets) from data acquisition through to verification and reporting. It offers significant savings and risk reduction to customers by coupling the power of cloud computing and project aggregation with years of industry expertise and best practices.
The Challenge

Mandate: 45% reduction in methane emissions from O&G by 2025 (National and sub-national)

- 45% of what? Small emission sources not well documented, but contribute significant proportion of methane venting
- Compliance (abatement) costs will range from $2/t CO$_2$e to $160/t CO$_2$e (10 year)
- Distributed methane abatement solutions available to address massive hi-bleed fleet
- Costs and information are the barriers - finding and scoping small projects is challenging
## Scope of Opportunity

<table>
<thead>
<tr>
<th>GHG Emitting Equipment</th>
<th>Total Alberta Equipment Count</th>
<th>Estimated Eligible Alberta Equipment Count</th>
<th>GHG Efficient Alternatives</th>
<th>Average Emissions Reduction (annual)</th>
<th>Average Capital Cost (Installed)</th>
<th>Estimated Total GHG Reduction Potential (over 10 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-bleed instruments</td>
<td>369,067</td>
<td>115,000</td>
<td>Low-bleed instruments</td>
<td>40 tCO₂e</td>
<td>$1,000 - 2,500</td>
<td>46,000,000 tCO₂e</td>
</tr>
<tr>
<td>Pneumatic Pumps</td>
<td>172,302</td>
<td>150,000</td>
<td>Low/No-bleed pumps</td>
<td>75 tCO₂e</td>
<td>$10,000 - 25,000</td>
<td>112,500,000 tCO₂e</td>
</tr>
<tr>
<td>Solution Gas Venting</td>
<td>19,000</td>
<td>8,000</td>
<td>Well site vent gas capture</td>
<td>500 tCO₂e</td>
<td>$20,000 - $60,000</td>
<td>40,000,000 tCO₂e</td>
</tr>
<tr>
<td>Vent gas (Engines)</td>
<td>31,968</td>
<td>10,000</td>
<td>Vent gas capture</td>
<td>1000 tCO₂e</td>
<td>$50,000 - $250,000</td>
<td>100,000,000 tCO₂e</td>
</tr>
<tr>
<td>Natural gas combustion engines</td>
<td>31,968</td>
<td>6,000</td>
<td>Air-fuel ratio controllers</td>
<td>600 tCO₂e</td>
<td>$150,000 - $300,000</td>
<td>36,000,000 tCO₂e</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>335 million tCO₂e</strong></td>
</tr>
</tbody>
</table>

“Lowest Hanging Fruit” (Current Opportunity)  
“Next Best” (Opportunity for Future Expansion)

Sourced from Alberta's Upstream Oil & Gas Assets Inventory Project – Opportunities to Reduce GHG Emissions. 2013.
The Opportunity

Our data confirm **pneumatic device conversions** are the $2/t to $10/t projects - and there are *hundreds of thousands to do*

- Cap-Op is working to help companies abate distributed methane emissions
  - Planning tool for low-cost execution
  - Robust emissions quantification
  - Carbon-backed project financing

- Regulatory framework can drive work
  - Carbon pricing drives economics
  - Upstream -> across jurisdictions
  - End-use in CA, benefits to CA
Distributed Methane Abatement Workflow

Carbon-Backed Project Financing
(Innovating on Funding)

MAP
(User Engagement & Software Development Underway)

DEEPP
(Operational)
Methane Abatement Platform

Field Data Capture

Cloud Storage & Analysis

Reports / Compliance

Petrinex / Geodiscover / 3rd party data
The field app syncs with the server using a WIFI or cellular data connection.

We use a packet-level data arrival confirmation system to handle flakey signals.
MAP: Back-end Tools

• Utility Analysis:
  • Gas pipelines / Co-op lines (conservation)
  • Disposal and storage wells (abatement / conservation)
  • Electricity lines (conservation via power generation or electrification)

• Clustering Analysis:
  • Methane destruction and conservation opportunities
  • Simple communication among diverse stakeholders

• Campaign Planning:
  • Route optimization
  • Equipment and tools available
  • Tracking and accounting progress (no double conversions)
Distributed Energy Efficiency Project Platform (DEEPP)

Cap-Op Energy Distributed Energy Efficiency Project Platform (DEEPP)
DEEPP Process

Conventional Process

- Office Data Management
- Field Data Management
- 3rd Party Data Management
- Data System Development
- Pre-Project Data Capture
- Pre-Project Data Review
- Installation Data Capture
- Post-Installation Data Capture
- Project Design Document
- Project Validation Support
- Annual Project Reports
- Project Verification Support
- Offsets

Cost: $8/tCO₂e
Total Risk: HIGH

- Inefficient
- Expensive
- High Risk

DEEPP Process

- Integrated Data Capture
- Project Design Document
- Project Validation Support
- Annual Project Reports
- Project Verification Support
- Offsets

Cost: $4/tCO₂e
Total Risk: LOW

- Streamlined
- Cost Effective
- Low Risk
Carbon-Backed Project Finance

Enhanced Performance: Corporate Environmental Stewardship + Low Cost Production and Reliability + Returns to Investors
Carbon-Backed Project Financing

- Accelerate projects based on carbon price, not energy price
- Leverage 3rd party funds for project capital

MAP
- Improve accuracy of methane emission reporting / carbon intensity estimates through enhanced granularity
- Decision support tool for identifying, evaluating and prioritizing methane abatement programs

DEEPP
- Robust quantification of distributed emissions
- Aggregated verification of emission reductions
- Project management and performance tracking
- Industry benchmarking
Making Sustainability Profitable... for California

- **Objective:**
  - Reduce carbon intensity of natural gas delivered to California
  - Mitigate risk of capital flows out of the state.

- **Sector Requirements**
  - Tools to streamline planning and implementation (MAP)
  - Site access and proven technologies
  - Robust quantification tools (DEEPP)
  - Supportive regulatory framework (carbon pricing / incentive)
Contact Information

Keith Driver, M.Sc., P.Eng., MBA
Founder and Director
Cap-Op Energy Inc.
403.860.8623
kdriver@capopenergy.com

Calgary – San Francisco
www.capopenergy.com