INVESTMENT-DRIVEN GROWTH

Carbon Credits for Directed Inspection & Maintenance

Partner Experience: NiSource

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Agenda

- Background and Methodology
- Findings
- Future work
- Takeaways
- Questions
Background

- NiSource (NYSE: NI):
  - Engaged in natural gas transmission, storage, and distribution
  - Delivers energy to 3.8 million customers from the Gulf Coast through the Midwest to New England

- Columbia Gulf Transmission (CGT):
  - Subsidiary of NiSource
  - Interstate pipeline system of approx 3,400 miles of pipeline
  - 11 compressor stations with nearly 0.5 million horsepower
Background: Natural Gas STAR Participation

- CGT has been a Partner since 1999
- 2001 and 2004 Transmission Partner of the Year (along with Columbia Gas Transmission)
Can You Find the Leak?

???
Background: Methane Emissions

- A colorless, odorless gas potent greenhouse gas (GHG) with:
  - 100-year global warming potential of 21
  - Atmospheric lifetime of ~12 years

- Difficult to detect or see using human senses

- Project barriers and lack of financial incentive:
  - Lack of gas ownership
  - No regulatory or SOP justification to address leaks

- VCS methodology provides outlet for:
  - Reducing emissions
  - Generating revenue
Background: The Carbon Market

Carbon market brings together generators and buyers of GHG emissions reductions
Background: Voluntary Carbon Standard (VCS)

- Q: What problem does VCS solve?
  - A: The lack of a well-defined carbon market in the U.S.

- What is it?
  - Organization that provides framework for establishing standards to obtain carbon credits
  - Creates and propagates guidance documents detailing how to attain carbon credits
  - Establishes procedures and standards for carbon registries
Background: Voluntary Carbon Standard (VCS)

- Credits must be: 1) real, 2) additional, 3) measurable, 4) permanent, 5) independently verified, 6) unique, and 7) conservative
- Can use existing methodologies under approved programs (such as Kyoto Clean Development Mechanism) OR use new VCS methodology
Background: Key Issues for Carbon Credits

- **Additional:**
  - Does this project go beyond the “business-as-usual” scenario?
  - Barrier analysis, including proof of exceeding common practice in industry

- **Real:** have happened

- **Measureable:** can be quantified with proper equipment

- **Transparent:** clear, easily traceable path of work performed (especially with measurement and record-keeping)

- **Conservative:** so as not to overestimate amount of reductions
Background: Process

1. **Selection of methodology**
2. **Drafting project document**
3. **Validation**
4. **Monitoring report**
5. **Verification**
6. **Register carbon credits**
Methodology: Clean Development Mechanism AM0023

“Leak reduction from natural gas pipeline compressor or gate stations”

- Methane-specific
- Very specific detection, measurement, monitoring, and record-keeping requirements
- More stringent than Leak Detection and Repair (LDAR)
Leak Detection Instruments

Heath Consultants Gasurveyor

Leak detection
Leak Tagging
Leak Measurement

- Hi Flow® Sampler
- Calibrated bagging techniques

CGT personnel calibrating a Hi Flow Sampler™
Leak Measurement

Quantifying packing vent with Hi Flow Sampler

Using calibrated vent bag for rod packing emissions
Findings

- Baseline studies conducted at 11 compressor stations
- Over 430 leaks found
  - 39 leaks per station on average
- Common leak types detected and quantified:
  - Suction and discharge valves
  - Open-ended line (OEL)/vent line
  - Blowdown valve
  - Compressor seal and rod packing
  - Doghouse vent
Findings

- **Stanton, KY**
  - Largest emissions from valve leaks (compressor suction and discharge)
    - As high as 637 m³/hour
  - Other sources:
    - Thread fittings, gaskets, tube connections
  - Total station emissions: 1,333 m³ methane/hour

Rayne, LA: compressor unit valves (suction and discharge)
# Findings

## All Site Emissions

<table>
<thead>
<tr>
<th>Site</th>
<th>Total Emissions (m$^3$ CH$_4$/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanton, KY</td>
<td>1,333</td>
</tr>
<tr>
<td>Hampshire, TN</td>
<td>543</td>
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<tr>
<td>Corinth, MS</td>
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<tr>
<td>Delhi, LA</td>
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<td>Houma, LA</td>
<td>92</td>
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<tr>
<td>Rayne, LA</td>
<td>88</td>
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<tr>
<td>Inverness, MS</td>
<td>58</td>
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<tr>
<td>Clementsville, KY</td>
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<td>Banner, MS</td>
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<td>Alexandria, LA</td>
<td>23</td>
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<td>Hartsville, TN</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>2,443</strong></td>
</tr>
</tbody>
</table>

Rayne, LA: common blowdown vent
Findings

A majority of the total methane emissions can be reduced by repairing a minority of the leaking sources

Emissions from Each Component at 11 Compressor Stations (436 total sources)

- Largest emission source in Stanton, KY (637 m³ CH₄/hour)
- 10 greatest emissions sources account for 76% of total emissions
- 376 smaller leaks not shown
Future Work

- Repairs performed on major leaking sources
  - Reduces majority of emissions
  - NOT cost-effective unless carbon credits involves

- Numerical values of credits determined from reduced leak rate
  - Baseline emissions – monitoring emissions = reductions
  - Reductions quantified as voluntary carbon units (VCUs)
Takeaways

- Carbon credits in the voluntary market are difficult to obtain
  - Large burden of proof (additionally: e.g., financial barrier, common practice)
  - Monitoring, data collection, and reporting must be conducted according to VCS standards and procedures

- Methodology provides unique opportunity for transmission companies to positively affect climate change
  - Reduce emissions
  - Earn revenue
Questions?

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