Natural Gas in a Carbon-Constrained World

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AGL Resources

Summary

• Natural gas value chain emissions have been declining steadily already
  • Continuous improvement in operating processes and technology yields operating efficiency and emissions reductions upstream
  • State-led pipeline safety and reliability programs have also captured LDC emissions reductions without undue costs to ratepayers
  • EPA’s Gas STAR program has promoted best practices in a successful way
• Natural gas value chain is poised to meet the carbon challenge
About AGL Resources

Sharing the Abundance

- With domestic natural gas production at all-time highs, AGL Resources has launched several initiatives to ensure that our customers can take full advantage of the energy revolution currently underway in the United States.

- Our efforts have focused on three areas:
  - **Access**: Direct Pipeline and Supply Investments
  - **Safety and Reliability**: Infrastructure Improvement Programs
  - **Economic Development**: Serving new markets and growth opportunities
  - **Environmental Sustainability**: Emissions reductions and replacing coal-fired electricity, oil, and other less benign fuels
The Carbon Challenge – Methane Blueprint

Obama Administration Released Methane Emissions Blueprint on January 14, 2015
• 40-45% reduction in oil and gas value chain methane emissions by 2025 (vs. 2012 levels)

Context:
• Methane was less than 10% of US greenhouse gas emissions in 2012
• ~30% of total US methane emissions were from oil and gas production, processing, transmission, and distribution (~3% of total US greenhouse gas emissions)
• Natural gas value chain – 1.3% leakage rate - about 2% of total US greenhouse gas emissions
  • Less than 0.5% of US greenhouse gas emissions are from LDC systems
    • The bulk of LDC emissions are in a handful of states
• BUT: Methane is 25 times more potent than CO₂ early in its life cycle

Natural Gas Value Chain Emissions

<table>
<thead>
<tr>
<th>Segment</th>
<th>2012 Leakage Rate (1.3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0.124 tcf (0.42%)</td>
</tr>
<tr>
<td>Processing</td>
<td>0.053 tcf (0.19%)</td>
</tr>
<tr>
<td>Transmission and Storage</td>
<td>0.116 tcf (0.44%)</td>
</tr>
<tr>
<td>Distribution</td>
<td>0.069 tcf (0.26%)</td>
</tr>
</tbody>
</table>
Natural Gas Utility Emissions

<table>
<thead>
<tr>
<th>Source</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline Leaks</td>
<td>49.5%</td>
</tr>
<tr>
<td>Meters/Regulators/City Gates</td>
<td>39.4%</td>
</tr>
<tr>
<td>Customer Meters</td>
<td>8.0%</td>
</tr>
<tr>
<td>Routine Maintenance</td>
<td>0.3%</td>
</tr>
<tr>
<td>Upsets (third party dig-ins, etc.)</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

Note: Includes non-hazardous Grade 3 leaks

ONE Future

- New trade organization comprised solely of companies in the natural gas value chain
- Committed to smart investments in processes and technology to reduce methane emissions
- Drive value for the environment, customers, and shareholders
- GOAL: Promote a flexible, performance-based and sustainable approach that focuses on addressing the most cost-effective abatement opportunities across the value chain
  - Recognize regional and segment-focused differences
  - Engage in a holistic, smart approach to drive emissions reductions and operating synergies
ONE Future Companies

- AGL Resources
- Apache
- BHP Billiton
- Columbia Pipeline Group
- Hess
- Kinder Morgan
- National Grid
- Southwestern Energy

ONE Future Approach

- Practical, methane emission reductions based on an intensity target that achieves an eventual 1% leakage rate across the natural gas supply chain
  - Update EPA inventories and establish a credible baseline emissions using latest science and data
  - Each sector assigned a leakage rate goal
  - Establish transparent and verifiable annual emission accounting and emissions data reporting standards
  - Promote a flexible, performance-based, best practices approach that focuses on addressing the most cost-effective abatement opportunities across the value chain
- Incorporate existing and new technologies and work practice standards but do not “lock” the company into a specific technology or practices
- Partner achieves its goal by meeting the intensity target for the sector for the year
Illustrative Multi-Year Path to 1% Target

<table>
<thead>
<tr>
<th>Sector</th>
<th>2015</th>
<th>20XX</th>
<th>20XX</th>
<th>20XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0.42%</td>
<td>0.38%</td>
<td>0.34%</td>
<td>0.32%</td>
</tr>
<tr>
<td>Gathering &amp; Processing</td>
<td>0.19%</td>
<td>0.18%</td>
<td>0.17%</td>
<td>0.16%</td>
</tr>
<tr>
<td>Transmission &amp; Storage</td>
<td>0.44%</td>
<td>0.40%</td>
<td>0.35%</td>
<td>0.31%</td>
</tr>
<tr>
<td>Distribution</td>
<td>0.26%</td>
<td>0.23%</td>
<td>0.21%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Total Upstream</td>
<td>1.31%</td>
<td>1.19%</td>
<td>1.05%</td>
<td>0.99%</td>
</tr>
</tbody>
</table>

The timeline to meet the target will be established after completion of the baseline emission estimates, the verification of emission reduction potential and the evaluation of barriers to adopting emission reduction technologies.

NOTE: Baselines and targets are subject to adjustment as new data is collected.

Administration Proposal

- Apply mandatory new technology to new and modified sources (regulation under Clean Air Act 111(b))
- Adopt voluntary approach for existing sources (no regulation under Clean Air Act 111(d), unlike power plants)
  - Expressly endorsed ONE Future approach
  - Build on successful EPA Gas STAR Program
- EPA Administrator Gina McCarthy: “… the most important thing to realize is if existing sources aggressively reduce their emissions, then it’s not clear that there will be cost-effective reductions (left to implement) that will necessitate regulation of existing facilities.”
LDC Emissions Opportunities

- PUC-led safety and infrastructure renewal programs in the states have had dramatic results.
- Overall, LDC emissions have decreased 22% since 1990, despite adding 600,000 miles of pipeline and 17.5 million customers (32%).
- Nearly 90 percent of potential methane emissions reductions from distribution systems since 1990 derive from pipeline safety programs that have replaced cast-iron and bare steel with plastic and protected steel pipe.

Infrastructure Improvement Programs

- Over the last 15 years, AGL Resources has completed $1.7 billion in infrastructure replacement and expansion projects.
- These types of projects are demonstrated to have a large impact on safety, reliability, emissions levels and cost control.
- Founding participant in EPA Gas STAR Program.
  - AGL Resources has reduced cumulative emissions by over 700,000 mt CO2E.
  - Across the United States, 38 states now have some kind of accelerated cost recovery program.
  - Each mile of pipeline replacement costs between $1.5 million and $5 million, depending on diameter and other factors (AGA).
  - Every $1 million in pipeline replacement generates 10 jobs (Rutgers, 2010).
Infrastructure Improvement Programs

• Virginia
  • SAVE (Steps to Advance Virginia’s Energy) is a $125 million, five-year program underway that will replace more than 200 miles of bare steel, cast iron, and vintage plastic mains and more than 13,000 service lines in the coming years.

• Illinois
  • 2013 law allowed utilities to implement “Qualified Infrastructure Programs”.
  • 10-year safety and system reinforcement program covering 6 comprehensive areas
  • Annual investment limited to surcharge recovery approximating 4% of base rate revenues
  • Program includes annual reviews
  • Accumulated investments periodically rolled into rate base
  • Nicor Gas infrastructure investments are expected to be $171 million in 2015.

Infrastructure Improvement Programs

• New Jersey
  • AGLR’s utility in New Jersey, Elizabethtown Gas, completed a utility infrastructure enhancement (UIE) that replaced roughly 96 miles of vintage pipeline.
  • Accelerated Infrastructure Program (AIR) currently underway replaces vintage pipeline throughout the state, $115.2 million in investments over five years.
  • ENDURE plan allows $15 million to be spent on storm mitigation and system reliability in response to Superstorm Sandy.

• Tennessee
  • Chattanooga Gas has plans underway to replace 110 miles of pipelines in Chattanooga.
FCG Distribution System Makeup (Material)

*Steel Main Mileage / % of System*

<table>
<thead>
<tr>
<th>Material</th>
<th>Main Mileage</th>
<th>% of System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare</td>
<td>3.0 mi.</td>
<td>0%</td>
</tr>
<tr>
<td>Coated</td>
<td>54.1 mi.</td>
<td>2%</td>
</tr>
<tr>
<td>Bare</td>
<td>0.6 mi.</td>
<td>0%</td>
</tr>
<tr>
<td>Coated</td>
<td>1088.7 mi.</td>
<td>14%</td>
</tr>
<tr>
<td>Plastic</td>
<td>1520.0 mi.</td>
<td>46%</td>
</tr>
</tbody>
</table>

FCG Distribution System Makeup (Decade of Installation)

*Main Mileage / % of System*

<table>
<thead>
<tr>
<th>Decade</th>
<th>Main Mileage</th>
<th>% of System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946-1969</td>
<td>1799.0 mi.</td>
<td>52%</td>
</tr>
<tr>
<td>1970-1979</td>
<td>395.7 mi.</td>
<td>11%</td>
</tr>
<tr>
<td>1980-1989</td>
<td>246.7 mi.</td>
<td>7%</td>
</tr>
<tr>
<td>1990-1999</td>
<td>276.3 mi.</td>
<td>8%</td>
</tr>
<tr>
<td>2000-2009</td>
<td>573.8 mi.</td>
<td>17%</td>
</tr>
<tr>
<td>2010-2019</td>
<td>176.0 mi.</td>
<td>5%</td>
</tr>
</tbody>
</table>
Conclusion

- The ONE Future approach provides the natural gas value chain with a practical, cost-effective path to meet federal methane emissions goals
  - Drives operating synergies as well as emissions reductions
  - Avoids undue costs on customers
  - Recognizes that safety and reliability improvements also yield emissions reductions
  - Respects state regulatory compact and primacy of regulation of LDCs
  - Rewards early adopters