Venting during the natural gas transmission sector in the United States is a significant source of methane emissions, given the global growth of natural gas systems. While natural gas is a relatively clean fuel, it also poses important methane emissions contributing to climate change. Reducing methane losses can reduce the impact on the environment, while also providing natural gas companies with a financial benefit.

Understanding Methane Emission Sources and Viable Mitigation Measures in the Natural Gas Transmission Sector: Russian and U.S. Experience

### METHANE REDUCING TECHNOLOGIES AND PRACTICES

Both Russia and the U.S. have extensive experience with implementing methane mitigation technologies and practices in the natural gas transmission sector. Such measures can be simple and low-cost, such as adjusting leaking equipment, to more complex installations such as installing dry seals as compressors. Table 1 highlights potential costs and payback times for the three technologies and practices described in this poster.

<table>
<thead>
<tr>
<th>Technology/Practice</th>
<th>Initial Cost ($10^6 m3/year)</th>
<th>Payback Times (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Seals</td>
<td>$10^6 m3/year</td>
<td>2 years</td>
</tr>
<tr>
<td>Directed Inspection &amp; Maintenance (DI&amp;M)</td>
<td>$10^6 m3/year</td>
<td>1 month</td>
</tr>
<tr>
<td>Pipeline Pump-down</td>
<td>$10^6 m3/year</td>
<td>1 month</td>
</tr>
</tbody>
</table>

#### Replace Wet Seals with Dry

**Russian Experience:** Gazprom operates both wet and dry seal compressors. Recognizing the advantages of dry seals, Gazprom began replacing wet seals, and its new compressors typically have dry seals.
- Gazprom retrofitted dry seal systems on over 250 compressors with varying capacities. This free reduced emissions, decreased operating costs, and enhanced the compressor throughput capacity.
- Because dry seal systems do not use auxiliary pumps, additional savings accrue from the added energy efficiency this provides. Wet seal systems require 50 to 100 kW of energy, while dry systems use only 5.4 kW.
- Loses auxiliary equipment with dry seals also means lower maintenance costs, even while the system reliability improves.

**U.S. Experience:** Several U.S. EPA Natural Gas STAR partners have also noted benefits from installing dry seals compared to wet seals.
- One U.S. partner company determined that installing a dry seal on an existing compressor reduced emissions by 7%, saving almost $167,000 in natural gas alone.
- Other partners found that dry seal systems can save as much as $25,000 per year, depending on the wet seal emissions of the existing compressor before the retrofit.

#### Directed Inspection & Maintenance (DI&M)

**Russian Experience:** Gazprom conducts regular DI&M studies at facilities across Russia.
- Measurements and calculations that Gazprom and VNIIGAZ have conducted in Russia indicate that methane emissions are less than 1% of the volume of gas produced and transmitted.
- Gazprom has determined that implementation of this practice is most effective for compressor stations and more than 10% of compressor buildings.
- On average, such surveys help reduce methane emissions by 10% per year to compressor stations, which can generate $70 million in additional gas sales.

**U.S. Experience:** Many U.S. transmission companies have experience with DI&M programs, and there are also specialized companies that will provide this service. A few examples include:
- Northern National Gas, a U.S. EPA Natural Gas STAR partner, reported significant savings from its DI&M program. For example, in 2008, it screened 667 miles of pipelines on recognizing compressors, leading to gas savings of $254,000 annually.
- U.S. natural gas producer El Paso discovered a cost-effective emergency leak that has saved the company $3.5 million a year. OGP National, Chesapeake Energy, and El Paso and many other transmission companies have also successfully saved money and reduced emissions through DI&M programs.

#### Pipeline Pump-down

**Russian Experience:** In Russia, Gazprom plans to implement pipeline pump-down on both existing and future pipelines with diameters ranging from 700 to 1,420 mm.
- Performing pipeline pump-down using gas-free portable compressors. Along in 12 km pipeline segment generated approximately 375,000 m3 of natural gas savings worth $60 million. In addition, the project saved Gazprom 40,000 m3 of methane emissions in general. Using portable compressors along major truck pipelines is a very cost-effective approach, as the practice can provide annual gas savings of 10-15 m3.

**U.S. Experience:** Several U.S. EPA Gas STAR partners have successfully used pipeline pump-down.
- One example is Southern Natural Gas Company, which reported that it used portable compressors three times at one location over a year to save $56,000 in recovered gas at an operating cost of about $8,000. The effort paid for itself in four months, while other companies reported even faster payback times.

### CONCLUSIONS

Natural gas companies in Russia, the U.S. and other countries have determined that reducing methane emissions can be profitable and feasible. Operators of natural gas transmission systems have many technology options to reduce natural gas losses at the same time that they reduce methane emissions. These range from simple leak repairs to larger-scale measures, such as permanent solutions on compressors. Sharing information on new methane mitigation technologies can help speed their adoption and provide operators with more options for reducing their gas losses.

Natural gas systems are a significant source of anthropogenic methane emissions globally. Moreover, it is estimated that, compared to the 1960 level, by 2030 global methane emissions from both oil and natural gas systems will increase by 54%, and that the importance of methane emissions from natural gas systems is only expected to grow.