Methane Emissions
Snapshots of Independent Research

SwRI provides technical recommendations and novel research to reduce facility total and point source emissions and help clients with government regulatory compliance

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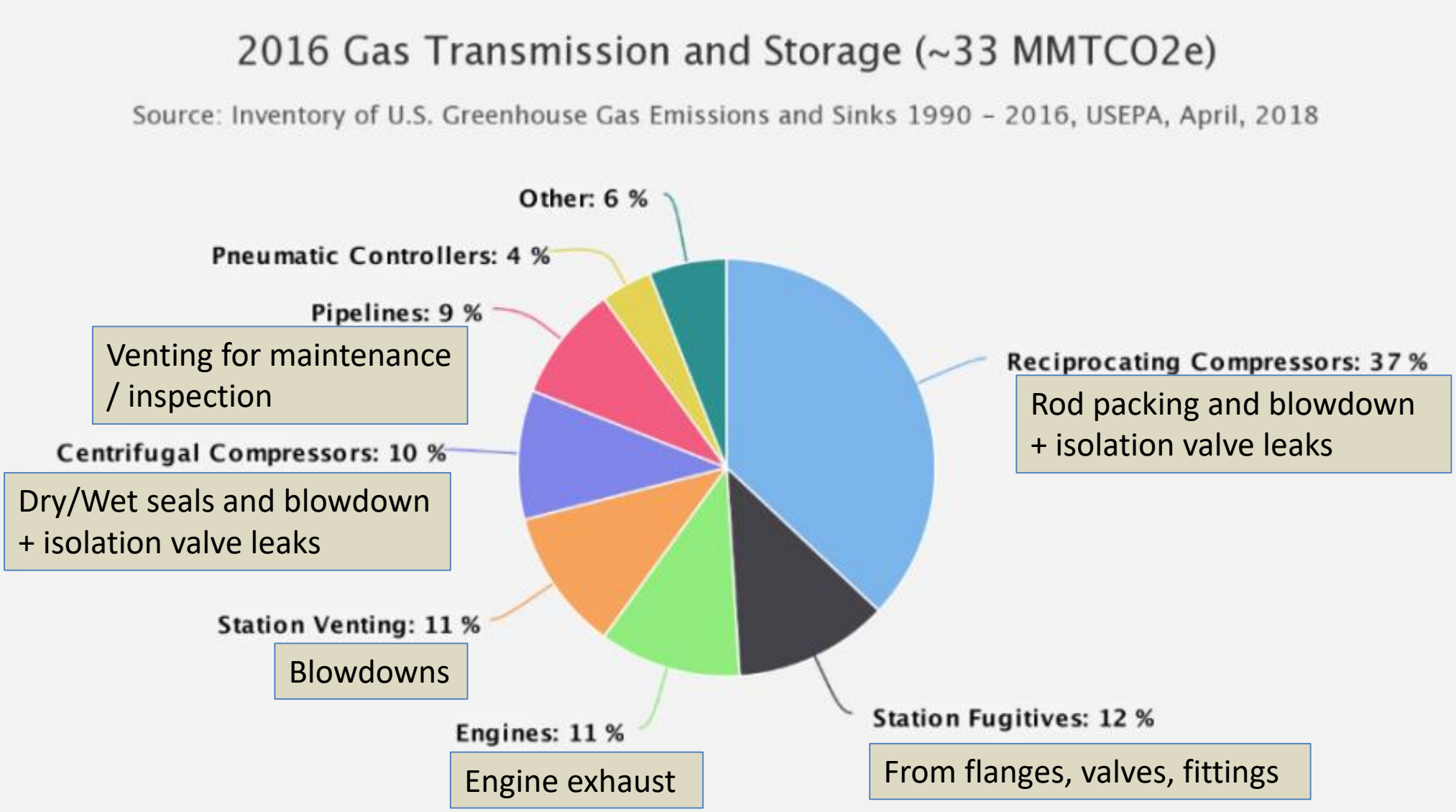
Breakdown of Emission Sources



Centrifugal Compressor Seals

- **Wet seals have little gas leakage at seal face**
  - High methane emissions occur through venting gas absorbed in seal oil to atmosphere
- **Dry seals also have very minimal amounts of gas leakage**
  - Most new compressors operate with dry gas seals
  - Primary methane emissions concern is failure of seal resulting in venting the compressor piping or entire station piping to atmosphere

Dry Gas Seal Failure Minimization

Purpose:

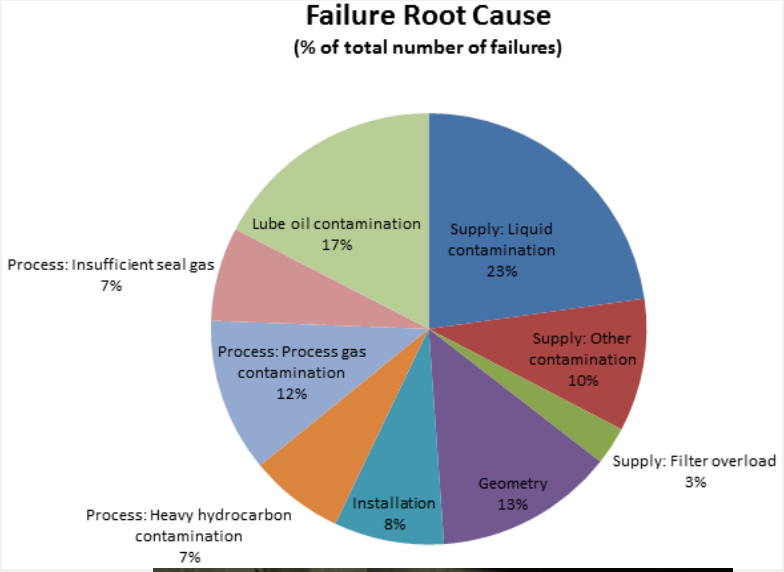
Minimize process gas leakage to atmosphere

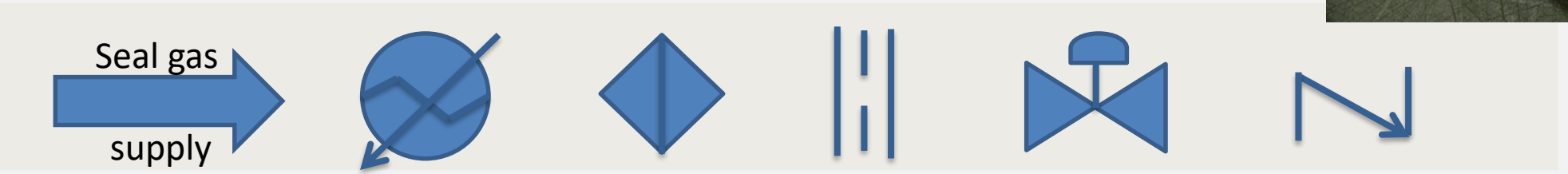
Reduce risk of damage due to liquid contamination (reducing blowdown events)

Procedure:

Improve and Integrate Each Component:

- Supply System Flow Analysis
- Correct Seal Type
- Phase Map Analysis
- Supply Gas Filtration
- Assessment of Instrumentation, Control, and Operation





Blowdowns and Startups

Blowdowns:

Station blowdowns and leaky isolation valves are a major source of emissions. Potential solutions:

- Don't depressurize
  - Actuated static seals for pressurized hold of reciprocating compressors
  - Gas booster for dry gas seals (potential long-term reliability challenges)
- Blowdown to fuel gas pressure

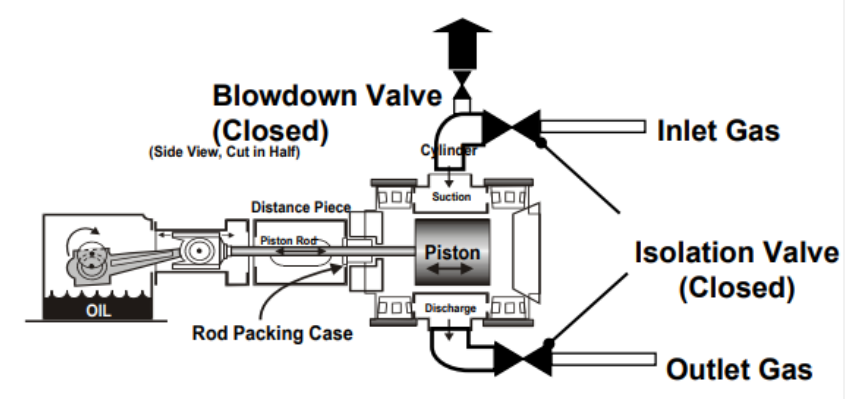


Image Source: Gazprom

Startups:

Gas expander starters are an avoidable emission source

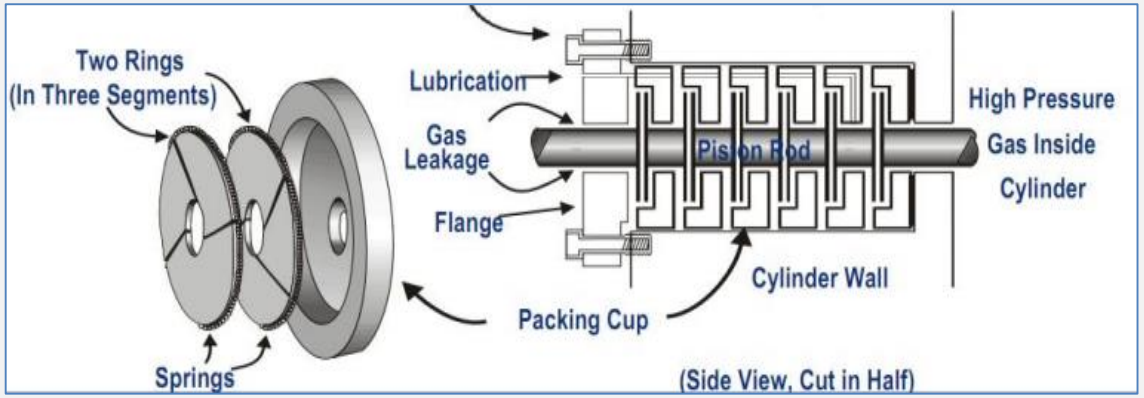
- Nitrogen expander
- Electric start
- Diesel/Gas engine starter

Image Source: TDI

Novel Reciprocating Compressor Packing Seal

- 2 Phase Project To Develop A Liquid Seal For Reciprocating Compressor Packing System

- Seal Development:
  - Jointly with NextSeal—patent holders
  - 95% reduction of methane emissions from typical packing seals
  - Goal: Take the concept to development and testing in full scale set-up
  - Timeframe: October 2016- October 2019



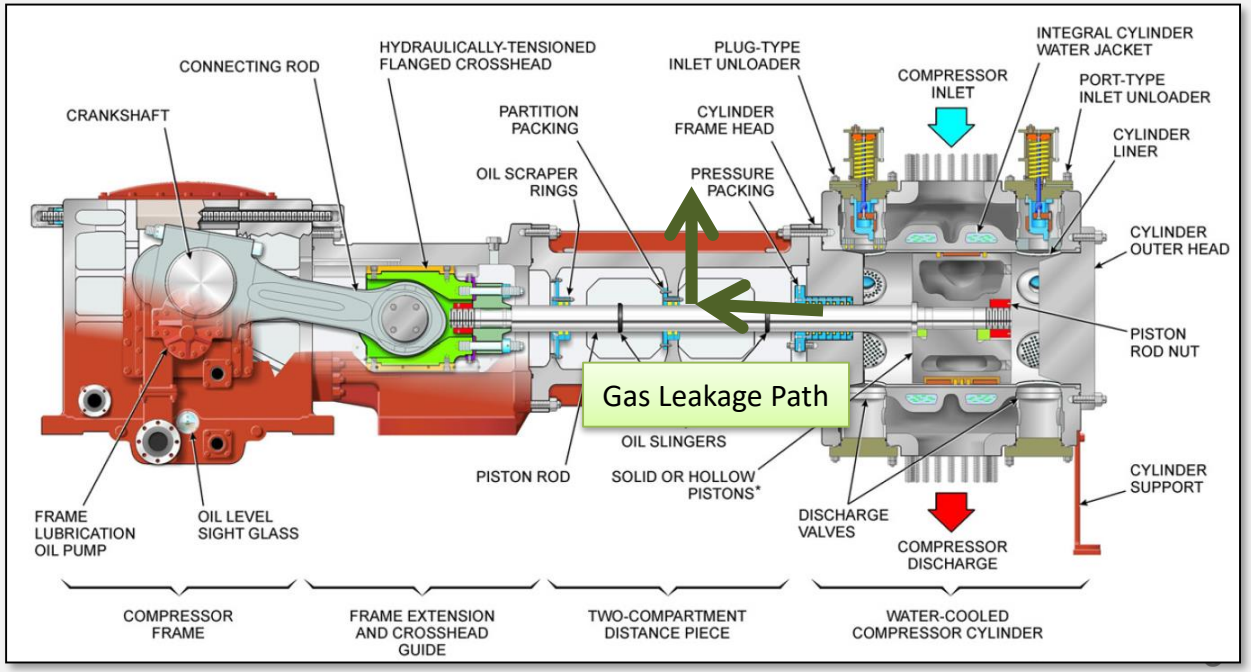
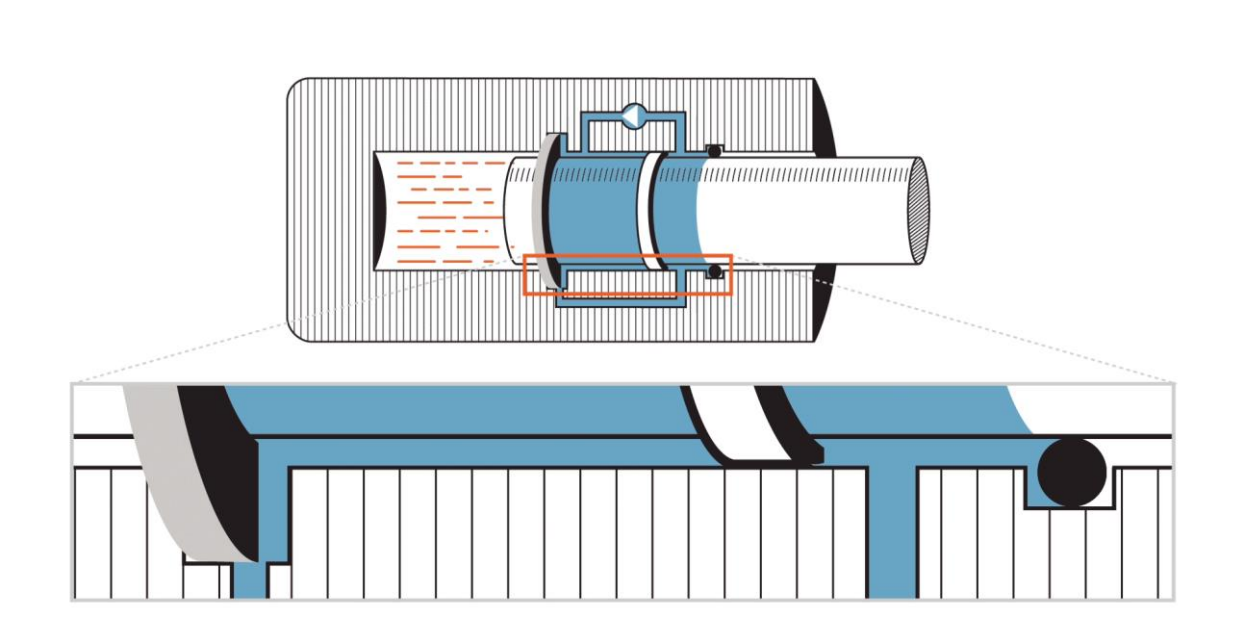
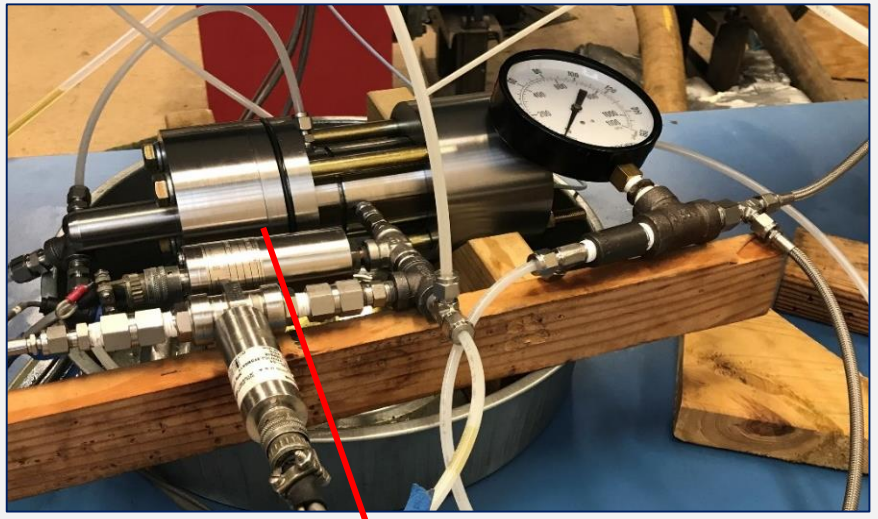
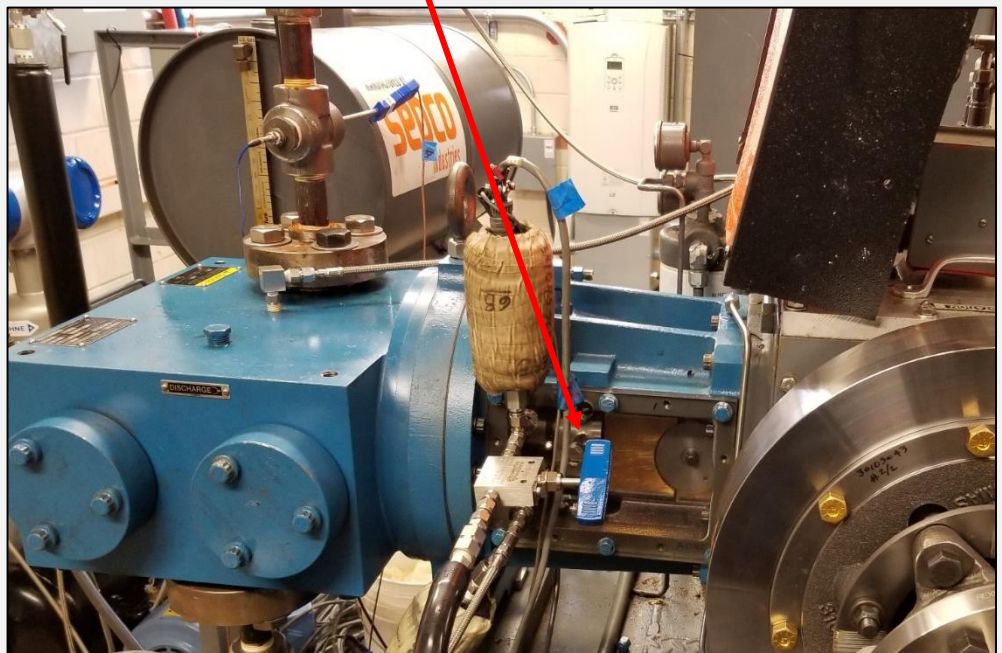


Image Courtesy of: Dresser-Rand

Implementation







The core of the patented NextSeal technology is to balance the gas pressure with an equal liquid pressure on the other side of the seal

Questions?

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