



Replace Glycol Dehydration Units with Methanol Injection



Technology/Practice Overview

Description

Depending on operating and ambient conditions, water molecules in natural gas may freeze and form gas hydrates—ice formations that encapsulate gas molecules. These gas hydrates can block pipelines and/or equipment. Gas hydrate formation is a potentially serious problem in natural gas flow lines starting at the production well all the way through to the customer delivery system. The effective inhibition of hydrate formation, especially during cold weather, is essential for producers and transmission companies if they are to maintain a continuous supply of natural gas. Methods to control freezing range from removing water from the gas stream to lowering the water's dewpoint.

One Partner simplified its field operations by replacing a glycol gas

dehydrator with methanol injection at some of its low-pressure (50 to 400 psi) gas gathering systems. Methanol injection prevented hydrate formation and proved to be a more efficient and simpler method of controlling gas hydrate formation in gas lines than glycol dehydration. Methane and volatile organic compound (VOC) emissions from the glycol dehydrator were eliminated. Energy costs were negligible because the methanol pump is solar-powered. The process proved so successful that this Partner converted more than 70 additional units.

Operating Requirements

Field personnel require training on the operation of methanol pumps and the proper handling and storage of methanol. The pumps, however, are no more complex than the glycol pumps they replace.

- Compressors/Engines
- Dehydrators
- Directed Inspection & Maintenance
- Pipelines
- Pneumatics/Controls
- Tanks
- Valves
- Wells
- Other

Applicable Sector(s)

- Production
- Processing
- Transmission
- Distribution

Other Related Documents:

Convert Gas-Driven Chemical Pumps, PRO No. 202

Pipe Glycol Dehydrator to Vapor Recovery Unit, PRO No. 203

Economic and Environmental Benefits

Methane Savings

Estimated annual methane emission reductions *800 Mcf average per installation*

Economic Evaluation

Estimated Gas Price	Annual Methane Savings	Value of Annual Gas Savings*	Estimated Implementation Cost	Incremental Operating Cost	Payback (months)
\$7.00/Mcf	800 Mcf	\$6,000	\$2,250	\$1,260	7 Months
\$5.00/Mcf	800 Mcf	\$4,300	\$2,250	\$1,260	10 Months
\$3.00/Mcf	800 Mcf	\$2,600	\$2,250	\$1,260	17 Months

* Whole gas savings are calculated using a conversion factor of 94% methane in pipeline quality natural gas.

Additional Benefits

- Reduced maintenance and downtime (primary benefit)
- Sale of previously vented gas volumes (secondary benefit)
- Reduced methane emissions (associated benefit)

Replace Glycol Dehydration Units with Methanol Injection (Cont'd)

Applicability

Replacing glycol dehydration with methanol injection is applicable to gas systems with a water content that does not meet pipeline specifications. These gas systems would require additional processing downstream to remove water (and now methanol as well) in order to meet pipeline specifications.

Methane Emissions

Glycol dehydrators are a source of methane and VOC emissions. One Partner eliminated these emissions by replacing glycol units with methanol injection to control hydrate formation in their low-pressure gas lines at more than 70 locations. It reported emission reductions ranging from 300 Mcf to more than 4,000 Mcf per facility—an average of 800 Mcf per location per year.

Economic Analysis

Basis for Costs and Savings

The methanol injection and solar-powered pump equipment can be installed for a capital cost of approximately \$2,250 per installation. The systems were converted to reduce maintenance and operation expenses. Methanol costs are \$3.45 per MMcf of gas throughput based on a treating ratio of 3 gallons of methanol per MMcf at a cost of \$1.15 per gallon. Assuming a throughput of 1 MMcf per day, the incremental operating costs (due to the cost of methanol required) are \$1,260. The salvage value of the dehydration unit was not included in the payout determination.

Discussion

By replacing glycol dehydration with methanol injection, it is possible to prevent hydrate formation while also avoiding methane emissions and loss of a valuable product. The primary justification for implementation of this project is reduced maintenance and downtime. Additional benefits include sale of previously vented gas and reduced methane emissions. The economic analysis is conservative in that it does not include the salvage value of the dehydration unit as well as the avoided cost for purchasing glycol.

EPA provides the suggested methane emissions estimating methods contained in this document as a tool to develop basic methane emissions estimates only. As regulatory reporting demands a higher-level of accuracy, the methane emission estimating methods and terminology contained in this document may not conform to the Greenhouse Gas Reporting Rule, 40 CFR Part 98, Subpart W methods or those in other EPA regulations.

Methane Content of Natural Gas

The average methane content of natural gas varies by natural gas industry sector. The Natural Gas STAR Program assumes the following methane content of natural gas when estimating methane savings for Partner Reported Opportunities.

Production	79 %
Processing	87 %
Transmission and Distribution	94 %