



Case Study

# AI-Driven Forecasting Reduces Methanol Injection Costs for Hydrate Inhibition

## The Methanol Injection Problem

Methanol is used in cold-climate natural gas pipelines as an anti-freeze to inhibit hydrate formation. Hydrates, solid, ice-like crystals, occur when low temperatures combine with high pressure and can have a catastrophic impact on pipelines. If not properly addressed, hydrates can corrode pipelines, impact flow pressure, plug the flow lines and offshore production facilities, or even cause pipeline explosions.

For such a critical and common challenge, operators struggle to determine the optimal amount of methanol needed to combat hydrate formation. They need to factor in gas flow rate, the amount of water in the gas stream, pressure and temperature changes across the pipe segment, ambient temperature, and wind velocity. These factors are constantly in flux, making real-time adjustments impractical. Instead, operators typically set a conservative minimum methanol injection rate for each month, adjusting for seasonality.

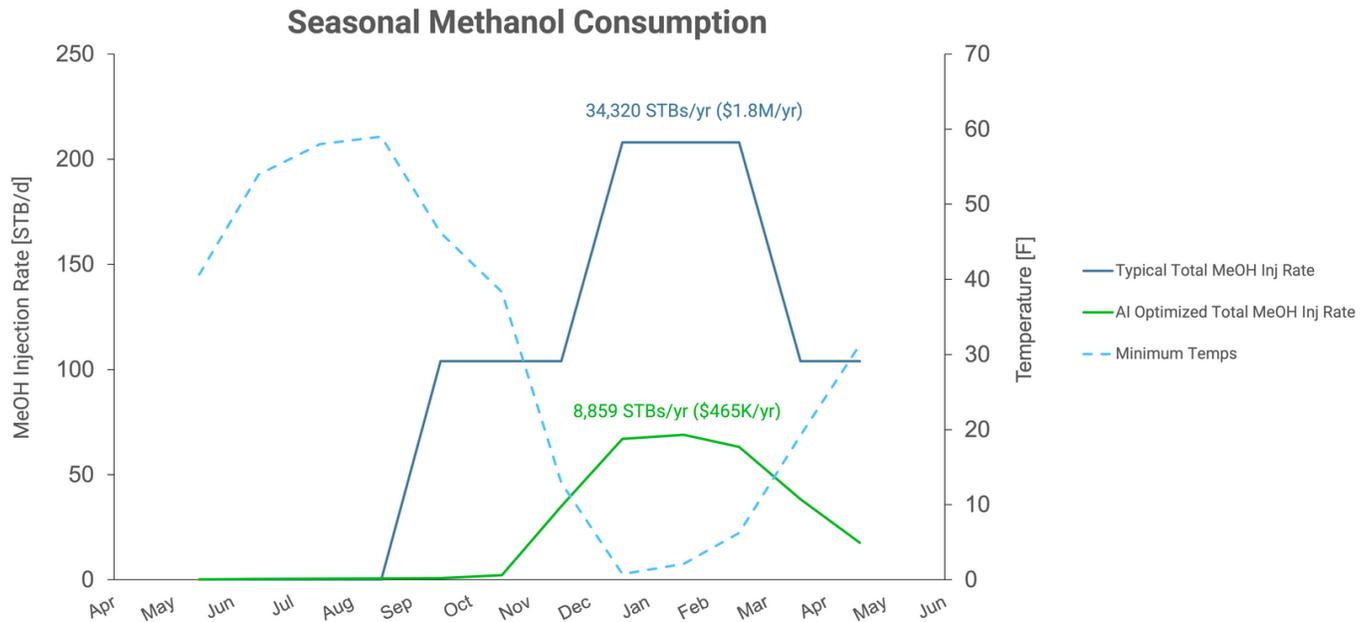
This approach may keep hydrate formation at bay, but it is far from optimal. Due to the complexity of these environments, operators include a large safety margin when estimating the amount of methanol needed. This overestimation results in wasted resources and funds. But what if we could minimize the methanol needed by using artificial intelligence (AI) to optimize for these complex factors?

## Leveraging AI to Forecast with Higher Accuracy

In addition to enabling the real-time optimization of complex industrial



equipment and systems, Geminus can drive optimal planning by combining simulation-quality insights with the speed and flexibility of AI. By leveraging simulation data from PIPESIM, a steady-state multiphase flow simulator, Geminus developed a surrogate model of an example pipeline network to capture system hydraulics with high accuracy.



Geminus model based on 2022 Chicago temperatures

With the intelligence provided by Geminus, an operator can determine with higher accuracy the minimum amount of methanol needed for the entire year. Compared to the 34,320 barrels that an operator would budget using their existing methodology, **Geminus calculates that only 8,859 barrels will be needed**. This results in a **\$ 1.3 million savings** in methanol resources for the year.

This kind of optimization isn't possible without access to fast, accurate insights. By adding an AI layer to existing simulation solutions, operators can reduce waste and significantly cut costs.



Geminus is an industrial AI optimization platform challenging the AI status quo. Our next-generation predictive intelligence solution fuses measurement data and physics to power resilient and efficient digital twins. This approach enables model creation in hours, rather than months. It's industrial AI, made easy.

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