

MAJOR ELECTRIC AND GAS UTILITY COMPANY

LIQUID NITROGEN FOR NATURAL GAS DILUTION

CASE STUDY #6

Company:

This major electric and gas utility company includes businesses of regulated electric and natural gas utility operations and other non-regulated energy-related businesses. Two sites are located in the Southeastern part of the U.S.

Design Challenges:

- Dilute incoming natural gas feed stock by 2.5% with nitrogen to control BTU quality
- Design and verify LN₂ for 2.5% of volume
- Four days of LN₂ on-site storage at 24 hours/day operation
- Design surge capacity in pipe downstream of vaporizers to minimize on/off cycling of pumps

Solution:

Install three 30,000 gallon storage vessels for a total of 90,000 gallons of LN₂ storage at Site A and four 15,000 gallon storage vessels for a total of 60,000 gallons of LN₂ storage at Site B.*

The pump skid is specifically engineered to provide optimum performance with the Chart Siphon design. The skid is self-contained, pre-assembled, and tested to meet specification requirements. The pump skid takes low pressure liquid nitrogen from the Siphon tank, increases the pressure, and force-feeds the vaporizers and downstream piping to the gas injector system.

* Each site to use one pump skid, four ambient vaporizers, and one nitrogen gas injector.



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Site A



Site B

Design basis specific to Site A includes:

- Requirements to dilute the LNG require nitrogen injection at the rate of 82,000 SCFH, equating to 16.4 GPM pumping and on-site storage of 93,000 gallons of LN₂ to meet the 4 days at 24 hours/day operation.
- 10" pipe tie-in
- GE PLC control system
- Additional flow meter required downstream of injector (use as a check meter) and must be compliant with applicable AGA custody transfer standards

Design basis specific to Site B includes:

- Requirements to dilute the LNG require nitrogen injection at the rate of 55,000 SCFH, equating to 10.8 GPM pumping and on-site storage of 60,000 gallons of LN₂ to meet the 4 days at 24 hours/day operation.
- 8" pipe tie-in
- Bristol control system
- Meter is an orifice style, must be compliant with applicable AGA custody transfer standards
- Instrument air circuit required at 100 - 115 psi

Outcome:

Successful economic dilution of incoming natural gas feed stock by 2.5% with nitrogen gas from LN₂ storage.