Cryogenic System Optimization

Quantifies and recovers losses on systems already in service. Engineering changes typically pay back inside 12 to 18 months.

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WHAT IT IS

Performance review of an existing cryogenic system targeting efficiency, reliability, or capacity. The review combines process simulation, equipment performance analysis, and field-data interpretation to identify recoverable losses and the specific engineering changes that capture them. Independent of equipment vendors.

WHAT IS COVERED

- Boil-off loss analysis on storage and transfer systems.
- Heat leak assessment across vacuum jacket, MLI, and perlite insulation.
- Heat exchanger effectiveness against design and current duty.
- Pump and compressor performance against curve, including cavitation and NPSH margin.
- Insulation system condition and degradation.
- Procedure review on cool-down, transfer, and vent sequences.

STANDARDS AND TOOLS REFERENCED

Aspen HYSYS simulation, REFPROP property tables, performance curve analysis, and boil-off and heat leak assessment under industry practice for LN2, LH2, LOX, and LNG service.

DELIVERABLE

Optimization report with specific engineering changes, projected savings stated in product and energy terms, and a phased implementation path so operations can act in priority order rather than all at once.

TIMELINE

3 to 4 weeks from kickoff.

WHO IT IS FOR AND WHEN THEY NEED IT

LNG operators, industrial gas facilities, pharmaceutical and biotech cryogenic storage operations, and aerospace cryogenic test infrastructure. Engaged when product losses do not reconcile with design, when an aging system is driving rising operating cost, when capacity is bottlenecked, or when a post-expansion system is not hitting design intent.

HOW IT WORKS

- Discovery call, 30 minutes, to confirm fit and frame the scope.
- NDA and document review: PFDs, P&IDs, datasheets, procedures, operating data.
- Fixed-scope written proposal with price, timeline, and deliverable defined.
- Technical review and analysis.
- Written report.
- Final review call to walk findings and recommendations.

PRICING

- Cryogenic System Optimization: $25,000 fixed fee.
- Initial Technical Screen: $3,500. Low-commitment entry to review a specific issue, system, P&ID, or operating concern. Credits 100 percent toward a fixed-scope engagement on conversion within 60 days.
- Advisory and ongoing project support: $175 per hour.

Fixed-scope engagements exclude PE-stamped drawings, field installation, procurement, construction management, and regulatory submission unless separately scoped. PE-stamped drawings and AHJ submission are coordinated with a licensed PE where required.

PRACTICE SNAPSHOT

Independent cryogenic, hydrogen, and CO2 engineer. EIT certified in California, B.S. Chemical Engineering, UC Davis. Experience across Nikkiso (turboexpander and expander-compressor systems, and hydrogen electrolyzer and CO2 purification process engineering) and Fennessy Engineering (cryogenic pump and skid systems for industrial gas and LNG, ASME and API standards). Current independent engagements support a Fortune 500 pharmaceutical operator, an industrial cryogenic facility, and a consumer products manufacturer. Technical writing on LinkedIn has reached over 150k engineers in the field: 157,200+ impressions and 114,000+ unique members reached, with top viewer companies including Nikkiso Clean Energy, Airgas, and Air Liquide.

CONTACT

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