A Fresh Look at Helium Recovery from LNG

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Do you know what’s in your gas?

Helium in natural gas provides opportunity
- Diversify from traditional oil & gas markets
- Generate additional revenue beyond LNG
Where Does Helium Come From?

- Formed by the radioactive decay of heavy elements in the earth’s crust (Uranium and Thorium)
- By-product of natural gas production
  - Only found in certain natural gas fields
  - Where gases formed together and capped by impermeable rock
Why Is Helium Important?
Where Do We Get Helium Today?

2019 Global Supply Estimated to be 6.2 - 6.4 BCF
Evolution of Helium Technologies

Supported by:
- Liquefaction
- Storage
- Transportation

- PSA Adsorption
  Small scale

- Cryogenic NRU/HeRU
  < 20 Units

- Cryogenic LNG HeXU
  > 20 Units

- Membrane HeXU
  Developing Tech.

- Distillation
  APD New Tech.

- Recovery & Recycling
  Developing Tech.

- Salt Dome Storage
  New Tech. (for He)

- Global Supply Disruption

- Hybrid
  New Tech.
Traditional Helium Recovery from LNG

Qatar & Algeria (Flash + He Purifier)

Darwin (NRU + He Purifier)
He Recovery from LNG BOG
Non-Cryogenic Approach

Vapor from ship during loading → Boil-Off-Gas (BOG) → BOG Compressor → Air Products BOG Helium Recovery Process

LNG to ship → LNG Tank
Details of AP BOG He Recovery System

BOG from compressor ~1% He

Membrane

5% He

7.5% He

adsorption system

70% He

Comp

Membrane

98+% He

BOG to recycle or turbine

Comp

BOG Return
Summary

- Global helium demand is expected to grow at ~3% rates
- New sources of helium will be required to meet demand
- Recovery of Helium from BOG creates new opportunities
  - Diversify from traditional oil & gas markets
  - Generate additional revenue beyond LNG
- Partnerships with industrial gas companies enable energy companies to link helium supply with demand
Make sure you know what’s in your gas!

Helium?

Thank you tell me more…