Biomethane Liquefaction - bioLNG

Description

Inlet biomethane stream from:

- Membranes
- > PSA/VPSA
- > Amine/Potassium Carbonate
- > Water scrubber
- > Any upgrading system

Process

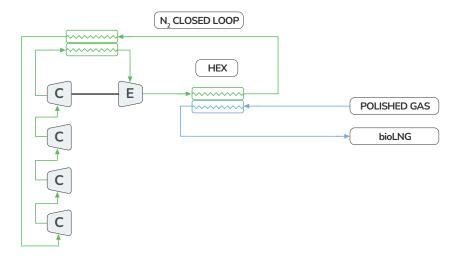
Ecospray provides **on-site biogas liquefaction solutions**, enabling the liquefaction of biomethane for the creation of a virtual pipelines for the widespread distribution of LNG. The liquefaction system is a fully scalable solution built around an inhouse designed **cryogenic chiller based on reverse Brayton closed-cycle technology**. The system can be configured to match desired LNG demand characteristics for **bunkering**, **power generation or transportation**.

Each module has the capacity to produce:

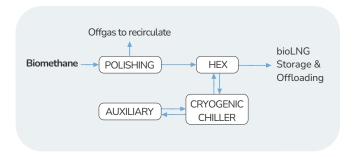
- 9.5 tpd of LNG @ -160°C/-256°F processing 550 Nm³/h or 0.5 MMSCFD;
- > 12.0 tpd of LNG @ -150°C/-238°F processing 620 Nm³/h or 0.6 MMSCFD.

The liquefaction system fully integrates all units (polishing, heat exchangers and cryogenic chiller) which are consistent with the specific process and can be configured for various types of inlet gas.

Biomethane liquefaction process



Flow diagram



Technical Information

Polishing

The polishing unit purifies biomethane to meet strict liquefaction standards—below 50 ppmv CO_2 and 1 ppmv H_2O . It uses three fixed-bed adsorption columns filled with selective synthetic zeolites (13X and 3A). Operated in a staggered cycle (adsorption, regeneration, standby), this setup ensures continuous polishing and prevents off-spec gas breakthrough.

Cryogenic chiller

The cryogenic chiller cools the inlet gas using a **reverse Brayton cycle with self-generated nitrogen** as the refrigerant in a closed loop. This process–compressing, cooling, and expanding the nitrogen–lowers its temperature below the inlet gas liquefaction point. This enables the **production of bio-LNG** at the required commercial quality for **transport**, **bunkering**, **and power generation**. The unit is designed to automatically compensate any nitrogen small leaks.

Features



- **Compact & modular design** skid/container (40-45 ft) with a flexible design to adapt to the user's available space, easy to transport, install and relocate.
- > **Reliable** separating the cooling media (nitrogen) and inlet feed gas ensures the maximum reliability by avoiding any contamination, corrosion and wear.
- **Efficient** moderate energy consumption for liquefaction, with operating costs mainly due to power comsumption.
- > **Flexible** possible to turndown the production of LNG to 40% of the maximum capacity and at desired LNG commercial specs (pressure and temperature).
- > **Safe** operational with self-generated nitrogen cooling media to avoid explosion or jet fire dangers with a zero GWP (Global Warming Potential).
- **Complete** containers come complete with insulation, lighting, air conditioning, doors and ventilation to facilitate operating activities.
- **Unmanned** a remote control of process variables is provided, including web-based access and proper database storage, allowing remote parameters control and proper maintenance scheduling. Plant data, including alarms, are available via OPC from the operator interface system (HMI).