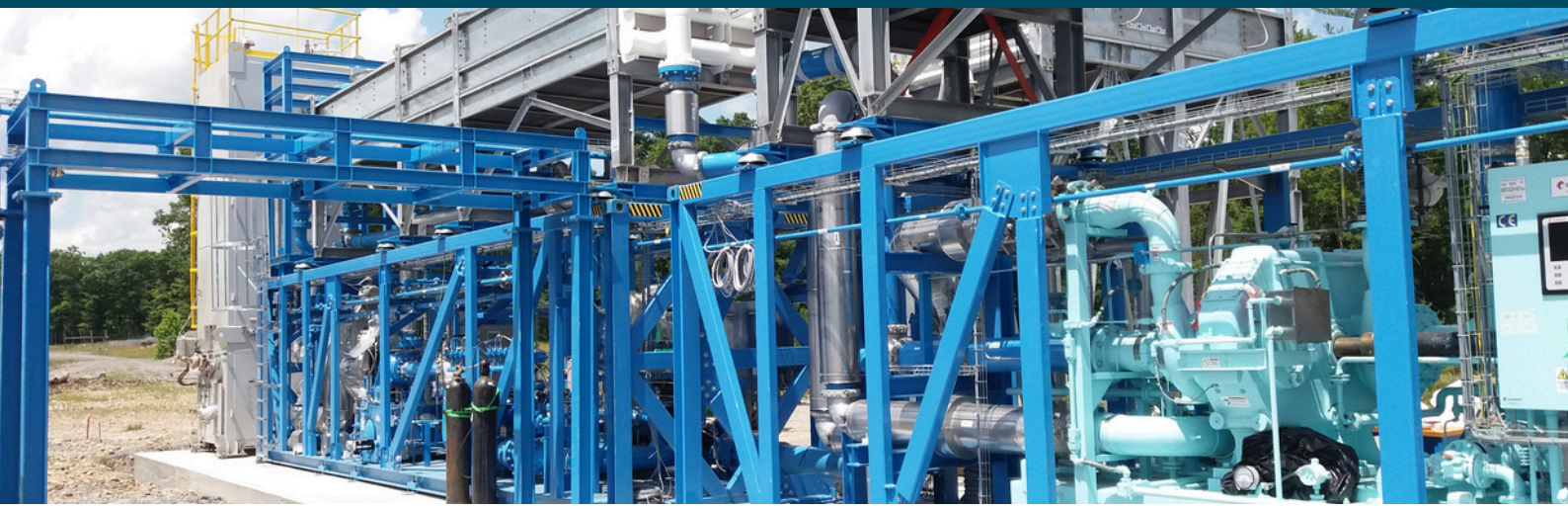
LQF-CH_4: Biomethane Liquefaction

Modular, Scalable, Containerized Plug-and-Play Solution



Biogasclean's RNG liquefaction modules are based on a dual-circuit design, consisting of a biomethane process circuit and a closed-loop nitrogen refrigeration system.
In its compressed form (Bio-CNG), biomethane is typically limited to an economic transport radius of approximately 100 km. Where grid injection is not feasible, biomethane can be converted into liquefied biomethane (Bio-LNG), enabling efficient long-distance transport and centralized distribution. Multiple production sites can supply a shared liquefaction module.

How it works

The system cools purified biomethane to cryogenic temperatures using a nitrogen expansion refrigeration cycle, condensing the gas into liquid form (Bio-LNG).
Liquefied biomethane offers significantly higher energy density compared to compressed gas:
1 litre of Bio-LNG ≈ 3 litres of Bio-CNG, enabling more efficient storage and transport.
This makes Bio-LNG a key solution for decarbonizing heavy-duty road transport and maritime applications, where high energy density is critical.

Applications

- Liquefaction of biomethane from agricultural, industrial, and wastewater-based biogas plants
- Fuel supply for heavy-duty transport and marine sectors
- Off-grid energy distribution where pipeline infrastructure is unavailable

Key Highlights

- Standalone or integrated solution with upstream upgrading systems
- Closed-loop nitrogen refrigeration (no hydrocarbon refrigerants)
- Fully manufactured and factory-tested prior to delivery
- Containerized, modular design for rapid deployment and relocation
- Designed for transport within standard ISO container formats
- Advanced process control via optimized expander operation
- Low-maintenance refrigeration circuit with no critical consumables

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Reference Installations

Caviro S.p.A., Faenza, Italy. One of the largest Bio-LNG plants in Europe

- **Capacity: 27 tonnes/day**
- **Feedstock: Wine by-products**

Offtake: LNG for transport applications (cars and trucks)

Frontier LLC, Pennsylvania, USA

- **Plug-and-play design using 3 × 40-foot ISO containerized skids**
- **Fully assembled and factory-tested prior to shipment**

Plug and play Bio NBC liquefaction modules - Technical specifications

Product line LNG processing	BIO NBC 250	BIO NBC 500	BIO NBC 750	BIO NBC 1000
Nameplate capacity – m3/day	11.5	23.1	34.6	46.2
Nameplate capacity – Tons/day	5	10	15	20
Nameplate capacity – LNG Gallon/day	3,050	6,100	9,100	12,200
Feed natural gas flowrate (at 100% NG Eff) – Sm3/day	6,662	13,324	19,987	26,649
Feed natural gas flowrate (at 100% NG Eff) – MMSCFD	0.234	0.468	0.703	0.937
Electrical performance and efficiency - Range kWh/Th LNG	1,050 – 1,150	1,000 – 1,100	905 – 1,050	900 – 1,000
Electrical performance and efficiency – Max. power kw	280	520	760	920
Footprint LNG processing equipment m2 | ft	700 | 7,500	800 | 8,600	900 | 9,675	1000 | 10,750

Liquefaction container incl. electric system is 45m long and 10m wide (ISO)

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