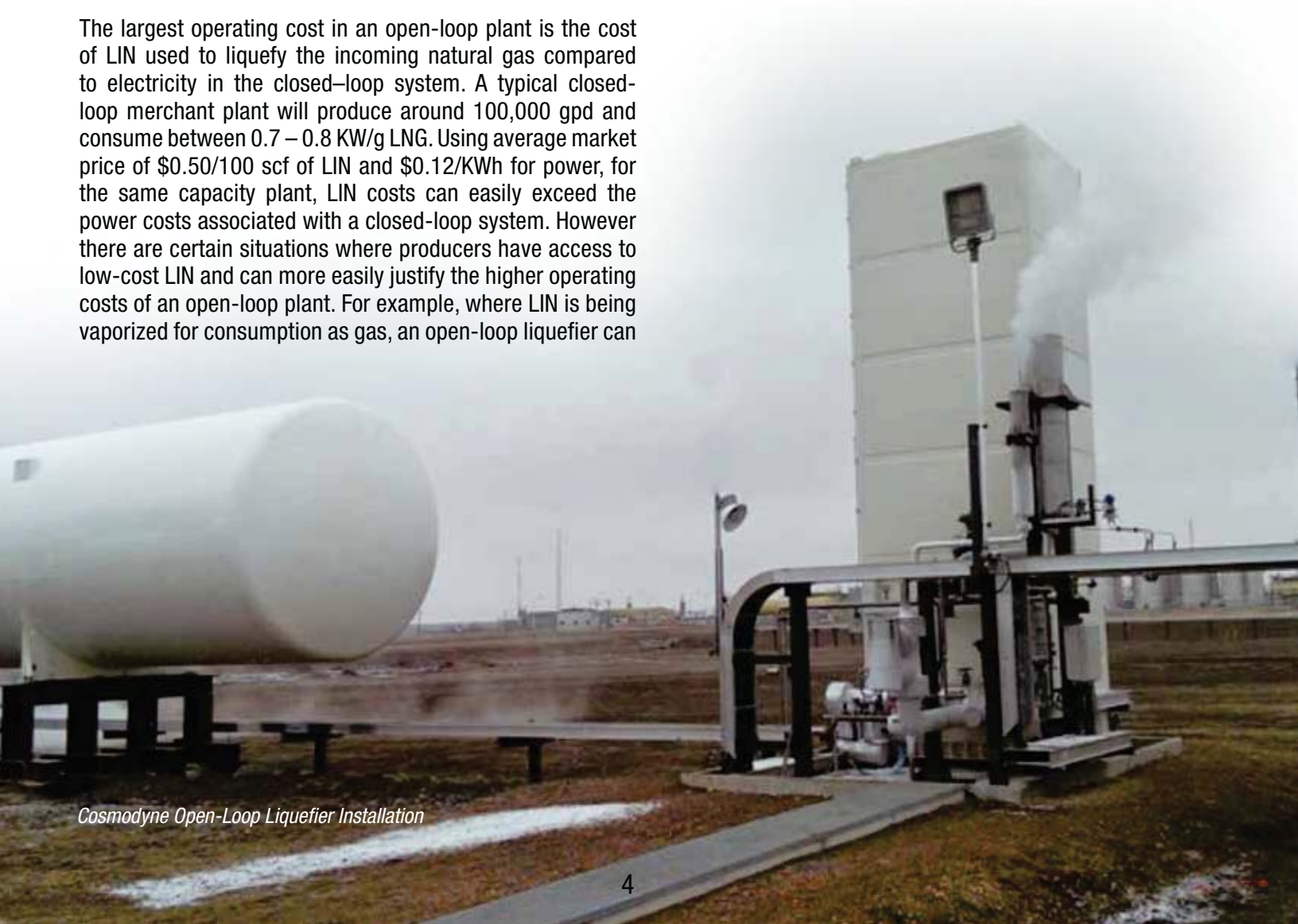
Pilot Programs and Open Loop Natural Gas Liquefiers

The market for LNG as an alternate fuel is evolving. There is considerable discussion about LNG vs. CNG and the cost of converting from diesel. The use of Open-loop type liquefiers could mitigate risk. They are simple and significantly less costly than conventional closed-loop systems. Open-loop liquefiers are designed to convert clean natural gas into LNG using liquid nitrogen (LIN) as the refrigerant. The conversion ratio is somewhere between 1.2 to 1.5 gallons of LIN for each gallon of LNG produced. While this liquefier design may seem to be impractical at first due to the cost of LIN, it is a quick-on-stream solution at a fraction of the cost when compared to a larger mid-scale closed-loop liquefier. This advantage is beneficial when the primary target markets are pilot programs for introducing LNG to new users and where the risk and uncertainty can be mitigated with the low capital cost. Furthermore, the simple design and modularity of the open-loop plant makes it ideal to relocate after a market has been developed and a more permanent and efficient liquefaction solution employed.

The largest operating cost in an open-loop plant is the cost of LIN used to liquefy the incoming natural gas compared to electricity in the closed–loop system. A typical closed-loop merchant plant will produce around 100,000 gpd and consume between 0.7 – 0.8 KW/g LNG. Using average market price of $0.50/100 scf of LIN and $0.12/KWh for power, for the same capacity plant, LIN costs can easily exceed the power costs associated with a closed-loop system. However there are certain situations where producers have access to low-cost LIN and can more easily justify the higher operating costs of an open-loop plant. For example, where LIN is being vaporized for consumption as gas, an open-loop liquefier can be substituted for the vaporizer. Also, there are LNG producers that also produce LIN from their own air separation plant. In this case, a producer's LIN costs likely would be 30% less or more than if they had to purchase LIN from the market.

From a capital perspective, the open-loop plant is significantly less to install. The equipment in an open-loop liquefier consists only of a LIN tank, a dual LIN pump skid, and a Cold Box containing cryogenic heat exchange equipment. Unlike a closed-loop system, the open-loop plant has no refrigerant compressors or turbo-expander sets which would require medium voltage power (4160V) and cooling water. Only a small amount of low voltage power (480V) is required for the LIN pumps and controls. Given the simpler configuration, the open-loop plant can be on-stream as much as 6-12 months faster than a closed-loop plant. Therefore, though the operating costs can be much higher, the lower capital cost of an open-loop liquefier gives LNG producers a low capital cost option to quickly enter a risky market.



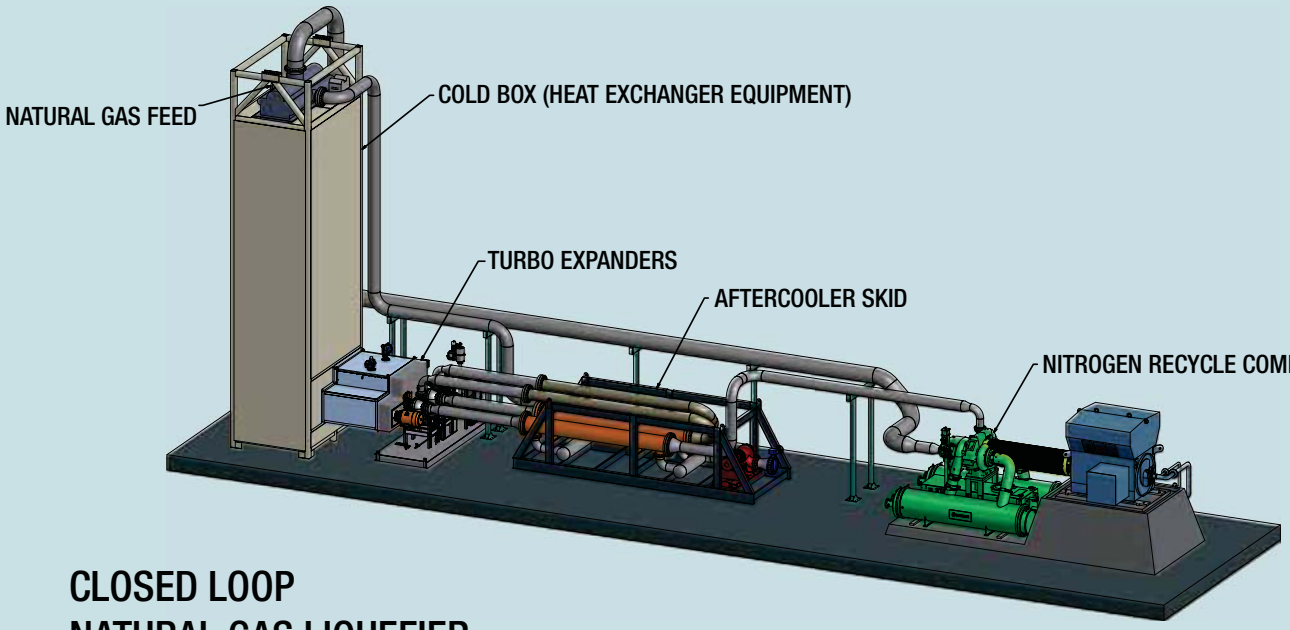
Cosmodyne Open-Loop Liquefier Installation

Cosmodyne recently commissioned an open-loop liquefier which was installed to develop the high horsepower market in the area. The producer's plan is to install a larger closed-loop system in a few years and move the open-loop plant to other new markets.

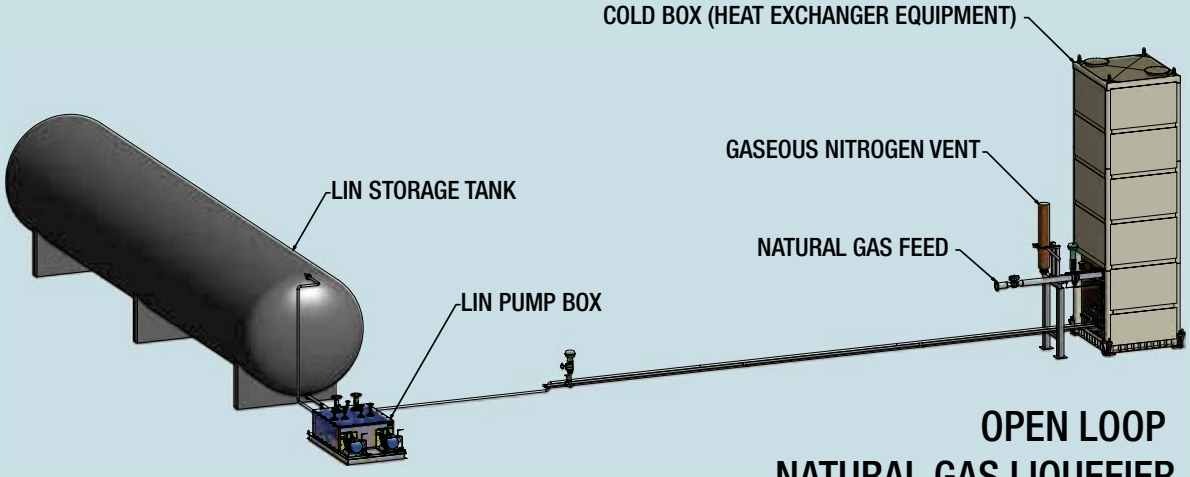
In today's LNG market there is some hesitation to adopt LNG use because the supply network has not been fully developed. Yet, at the same time, producers have been slow to install capacity because adoption of LNG use has been slow to evolve. This specific quandary makes the small open-loop liquefier a good, low-risk option for producers to add capacity quickly and build up demand without having to commit to the high cost of purchasing and installing a permanent closed-loop system.

If you have any questions, please contact us at info@cosmodyne.com.

Dual LIN Pump Skid On Cosmodyne's Open Loop Plant Installation



CLOSED LOOP NATURAL GAS LIQUEFIER



OPEN LOOP NATURAL GAS LIQUEFIER