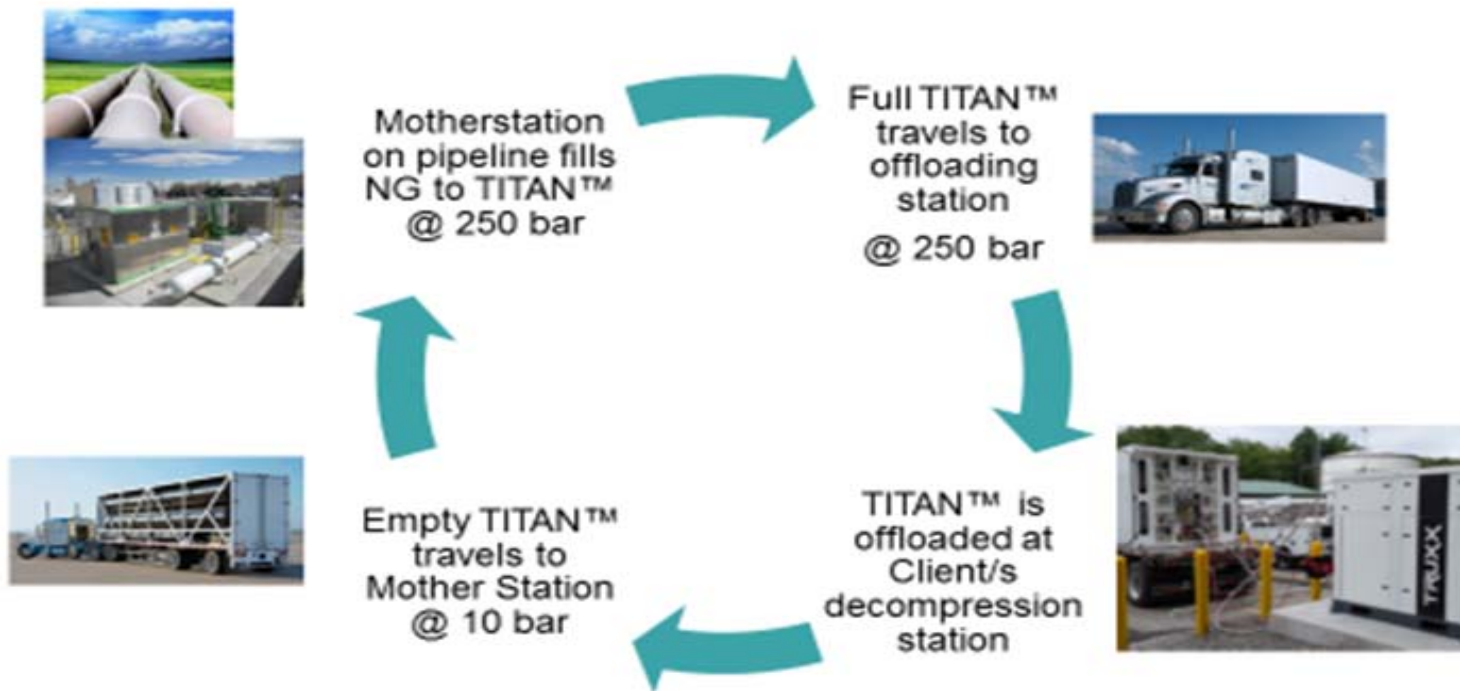


Compressed Natural Gas (CNG)



CNG model

THE MOBILE PIPELINE™ – HOW IT WORKS



Community Gas



Service areas and facilities

- Communities served by Yukon Electrical
- Yukon Electrical hydro generating station
- Nasittuq Radar Sites
- ATCO Structures & Logistics project sites
- Communities served by Yukon Energy
- Yukon Energy hydro generating stations
- 138 kV transmission lines
- other transmission lines



- Areas that do not have access to pipeline natural gas may seek to have natural gas delivered to the town.
- Several community gas projects currently being developed in North America. Ontario Energy Board has case underway to review expanding access to natural gas, including trucking solutions.
- Will likely require additional approvals from utility regulators to ensure utility level reliability.
- CNG is an option depending on the location of pipelines to offer natural gas to these communities.
- Typically, a local distribution company will provide a network of natural gas piping within the town.
- The town will be served by a single decompression plant. The gas developer will have to review available redundancy options and determine which is most suitable.

Information presented at HHP Canada, Feb 2014

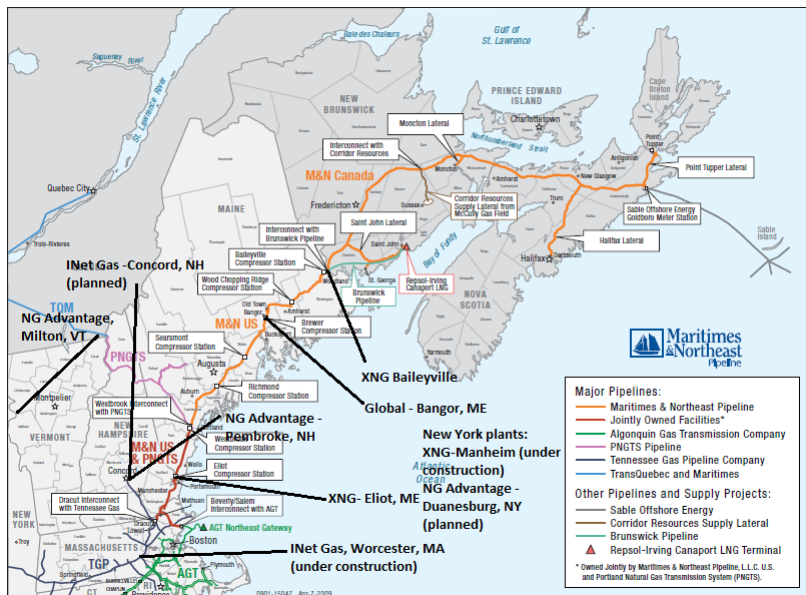


Planned & unplanned outages



- G-series units were designed to mount to a trailer using ISO connections.
- Once the unit is brought to a site, gas flow can begin within 30-minutes of arrival.
- Unit weight with trailer can be pulled by heavy duty pickup.
- Variable outlet pressures can be achieved with a pilot on 1st stage regulator.
- Over-pressure protection achieved with worker-monitor configured regulators.

CNG Compression



New England, New York, and Pennsylvania have 10-compression plants designed to load CNG trailers. These facilities take pipeline natural gas, dry the gas, and pressurize it to 3600-PSIG. Compression rates of up to 10,000 SCFM are achieved at some of these plants.

CNG compression plant picture from NG Advantage, Milton, VT.

CNG Transportation



Large tube trailers made by Lincoln Composites (Hexagon Company) are common around the world. This trailer hauls approximately 500 MCF (14,165 m³)

Pipeline

Mother Station

OTR Transport

Off-load station

Factory



Cylinder and steel tube trailers are also used, although with smaller capacities



CNG Off-load Station



Consists of: Trailer connection points, gas heating system, pressure reduction & regulation system, custody transfer meter, ESD, and system controls (temperature, pressure, and valve position).



Also referred to as:
Joule-Thomson skid
Off-load panel
Decompression Skid
Daughter station
Pressure Reduction Station

Algas-SDI is focused solely on CNG decompression equipment. With us, decompression equipment is not an after thought.

CNG Decompression challenges

- Joule-Thomson effect
 - The temperature of a gas or liquid decreases when forced through a rapid expansion while insulated.
 - Heat must be added to counter the J-T Effect.
 - Algas has multiple methods available to provide heat.
- Maintaining constant pressure and temperature
 - Unique approach of active gas blending to obtain constant discharge temperature
 - 2-stage pressure reduction used to provide constant discharge pressure.

TRUXX, G-Series Decompression



TRUXX G-Series unit with Hexagon-Lincoln trailers near Williston, ND. Picture provided by FERUS.

TRUXX, G-Series Decompression

Algas-SDI recognized the need for a CNG decompression unit that required a small electrical connection, is portable, and simple to install. The result is the G-Series decompression system.

- Both single stage and two stage units available with capacities of 21, 40, and 75 MCF per hour
- Units are designed to be operational and flowing natural gas in 30-minutes or less if needed.
- All G-Series units are built in a 20' ISO shipping container
- Designed to operate in a Class 1 Division 2 electrical classification area.
- Weights are estimated at 11,000 – 12,500 pounds depending on capacity. This unit can be moved on a gooseneck trailer with a heavy duty pickup.
- The electrical connection required is 20-Amps, single phase, 120VAC.
- PLC is designed with Ethernet connection to allow CNG distributor access to process information and alarm conditions.
- Single stage decompression for portable applications where discharge pressure may need to be adjusted. Outlet pressure range of 30-250 PSIG.
- Two stage decompression for fixed installations where more stable discharge pressure is desired
- Metering solutions for operational needs or custody transfer applications.
- Ease of maintenance is a concern for CNG distributors. The G-Series unit is designed to allow ample space to work on the unit inside the container.

TRUXX, G-Series Decompression



Notable interior design elements:

- Ambient draft heater units. Each heater requires ~70 gallons of glycol.
- Slip stream of natural gas used for heating.
- First stage pressure reduction is achieved with pilot operated High Pressure Motor Valves. This allows to 1st stage discharge pressure to be adjusted.
- Pilot operated cold gas bypass allows the system to respond quickly to changes in required heating needs.
- All components prior to 1st stage regulators are rated to 4500-PSIG
- Components on inlet side of unit have a temperature rating of -70°F (-56.7°C)
- Low pressure volume bottle allows system to adjust to rapid changes in customer demand.
- Coriolis meter removes moving parts from meter.
- All relief valves and vent valves relieve outward and upward.
- Software interlocked fan starts with 20% LEL or when temperature inside container exceeds set point.
- Inlet valves are controlled by PLC to maximize the amount of gas drawn from each trailer and ensure stable outlet pressure.

TRUXX Safety

Algas-SDI believes safety is core to CNG

- Pressure Relief Valves & slam shut valves used to protect piping
- High pressure piping & valves rated for 6000-PSI & temperatures of lower than -70°F (-56.7°C). Lower temperature ratings available
- Reliable E&I controls. Can incorporate watchdog on PLC to ensure PLC operation.
- Actuated valves on each fill connection. Can be programmed to close in the event of emergencies or by remote access from centralized operation center.
- Emergency Shutdown circuitry employed on CNG to ensure emergencies are handled separately from normal operations.
- Positive ground and authorization switches ensure operator has performed necessary steps to connect trailer.



Questions?

