

OffgridCNG

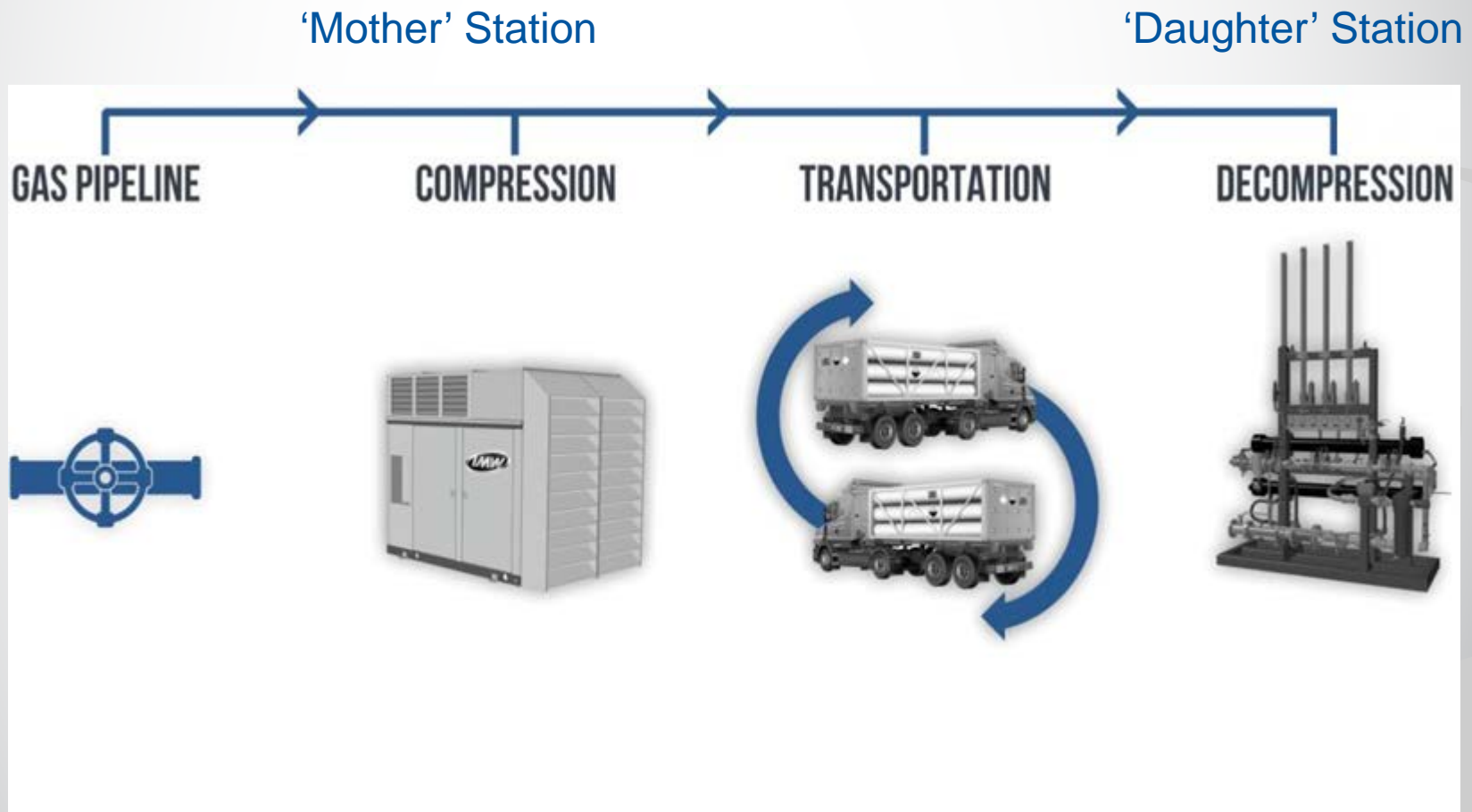
by  Clean Energy[®]

Last Mile CNG Delivery

What is
IndustrialCNG?



System Overview



Gas Pipeline

- Typically transmission lines (300 psi / 20 bar – 1000 psi / 70 bar)
- Higher pressure means less compression is required – less energy consumption
- Location of mother station is often flexible
- Require gas with low water content or gas dryer
- Require natural gas with >90% methane



Compression

- The heavy-duty, industrial CECC compressor frame can handle the broadest range of operating conditions and flow requirements.
- Multiple twin CleanCNG compressors (500 to 3000 hp is typical)
- Non-lube technology is important to ensure trailers don't fill up with oil
- Electric or engine drive
- Typical equipment:
 - Compressors
 - Chillers
 - Fill Posts



Transportation

- CECC coordinates with Tube Trailer manufacturers to ensure the appropriate pressure vessel storage system for CNG transportation.
- Trailers are made up of small or large cylinders in 4 types:
 - Type 1 – 100% steel
 - Type 2 – hoop wrapped steel
 - Type 3 – hoop wrapped aluminum
 - Type 4 – fully composite
- Customers typically buy trailers direct



Decompression

- Typical equipment
 - Decanting Posts
 - Pressure Reducing Modules
 - Heating Control Modules
- Oversized heating system for pressure & flow transitions
- User friendly touch-screen HMI for set point and alarm control





ONLY

Clean Energy
Compression

3 Exclusive Competitive
Advantages

Exclusive Competitive Advantages

ONLY #1: FullFill Technology ensures that every bulk gas shipment is completed quickly and filled as completely as possible. Our systems ensure that transport modules are filled at the optimum temperature and gas density through:

- Integration of proprietary compression technology and comprehensive dispensing architecture.
- PLC controlled continuous thermal management



Exclusive Competitive Advantages

ONLY #2: Maximum Offload Capacity ensures that only a minimal amount of gas is left on the trailer before it is disconnected. This is achieved by:

- Using two line unloading methodologies where possible
- Designing systems for minimal pressure drop
- Employing scavenging compression where necessary to remove remaining gas



Exclusive Competitive Advantages

ONLY #3: Proven Scalability to provide standard product to custom applications with current systems installed with capacity of up to 14,000 Nm³/h.

- Provides redundancy, reliability and quality.
- Can easily add more units if demand increases, or remove equipment and move to several smaller sites once gas pipeline arrives





WHY Clean Energy Compression?

5 Exclusive Advantages

CEC Exclusive Advantages

CECC's non-lubricated compressors set the global standard for minimum oil carry-over in CNG compressors

without the waste, cost and negative environmental issues of additional filters, auto oil drain systems and supplementary oil tanks. Only 5 parts-per-million or less vs. 100 PPM or more.

- Lower operating costs: Oil litres/year: Lubricated systems= up to 1200 vs. IMW = 80 in crankcase
- Lower maintenance costs: no oil accumulation in compressor or vehicle systems. Happier customers and increased station profitability.
- Inside a CNG vehicle, onboard CNG stored at 3600 psig is regulated to 100 psig by a regulator and then injected into engine. There are many examples of oil soaking the regulator diaphragm, affecting its accuracy and, in some cases, causing a rupture of the regulator internals if oil clogs the regulator.



“ The majority of engine performance issues are attributable to oil carryover, which is a problem that begins at the fueling station. ”

Leo Thomason, Executive Director
Natural Gas Vehicle Institute
“The Achilles Heel of Natural Gas Vehicles”

CEC Exclusive Advantages

CECC is the largest and only exclusive manufacturer of non-lubricated CNG compressors globally making us a proven manufacturer with the world class experience you need supporting you

- A century of manufacturing experience
- 3 decades of non-lubricated CNG compressor manufacturing experience



CEC Exclusive Advantages

The best durability and reliability in the industry

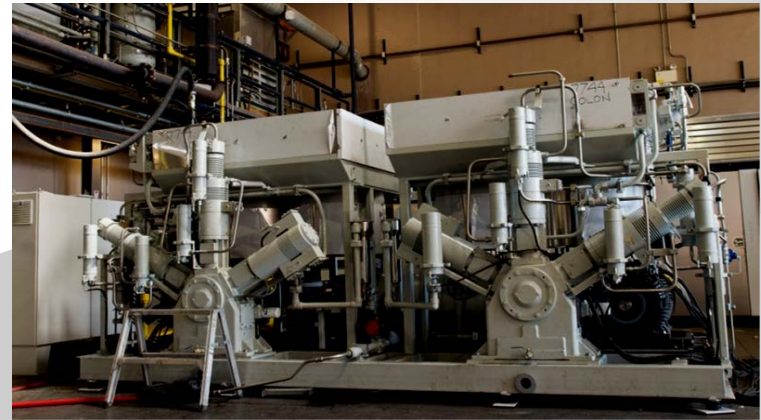
- CECC has the most northerly long term operational installation in the world in Barrow Alaska, which, combined with our installations in Qatar demonstrate reliable commercial operation across more than a 110oC temp range and some of the most abusive conditions on earth
- Gas dryers are installed on low pressure inlet not the high pressure discharge, keeping CECC compressor system dry with better chances of not freezing during the extreme temperatures of winter.
- Existing installation in South America still running at 70,000 hours



CEC Exclusive Advantages

CEC is the only manufacturer offering advantages of multiple modular configurations

- Allows for variable supply for higher efficiency at low demand periods
- Full redundancy and enhanced reliability



CECC Exclusive Advantages

The only manufacturer that covers the widest spectrum of compression requirements with a single block instead of multiple, unique machines:

- Less training required – better maintained machines
- Common parts – lower inventory, lower cost of ownership





Clean Energy Compression is the leading provider of CNG equipment, including compressors, dispensers, gas control systems and CNG storage worldwide.

We manufacture high-quality products with superior reliability and unique technological advantages to reduce operating costs, improve efficiency, increase flow capacity and optimize station performance. Clean Energy Compression delivers timely after-market service worldwide, including technical support and parts.

Clean Energy Compression operates as a wholly owned subsidiary of Clean Energy Fuels Corp. (NASDAQ: CLNE). Clean Energy is the largest provider of natural gas fuel for transportation in North America and a global leader in the expanding natural gas vehicle market. Clean Energy has operations in CNG and LNG vehicle fueling, construction and operation of CNG and LNG fueling stations, biomethane production, and compressor technology.

43676 Progress Way
Chilliwack, BC, V2R 0C3, Canada
o +1 604.795.9491 f +1 604.792.3806
www.cleanenergyfuels.com/compression

