



LNG Benefits for Operators and North Dakota

May 3, 2019



Liquefied Natural Gas - LNG

LNG – SAFETY AND ENVIRONMENTAL ADVANTAGES

Liquefied Natural Gas

- Is colorless, odorless, non-toxic, non-corrosive cryogenic liquid that is produced by cooling natural gas until it condenses into a liquid (-250 °F)
- Looks like boiling water when placed into a beaker
- Leaves no contaminants, eliminating risk to ground water if released
 - When LNG comes into contact with any warmer surface such as water or air, it evaporates rapidly, returning to a gaseous state
- Low flammability range
- Cannot explode in open atmosphere
- Provides significant emissions benefits over alternative fuels such as fuel oil, diesel and propane
- Provides increased operational reliability
- Reduces O&M costs on many applications



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LNG EMISSIONS BENEFITS vs DISTILLATE FUELS & PROPANE

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
CO2	20-30%									
CO	Up to 75%									
NOx	50%					90%-99%				
GHG's	20%									
VOC's	55%									
Particulate Matter	87%-95%								99%	
Ground Water Contamination Risk= 0 No high pressure combustion risk										

Environmental Benefits of LNG:

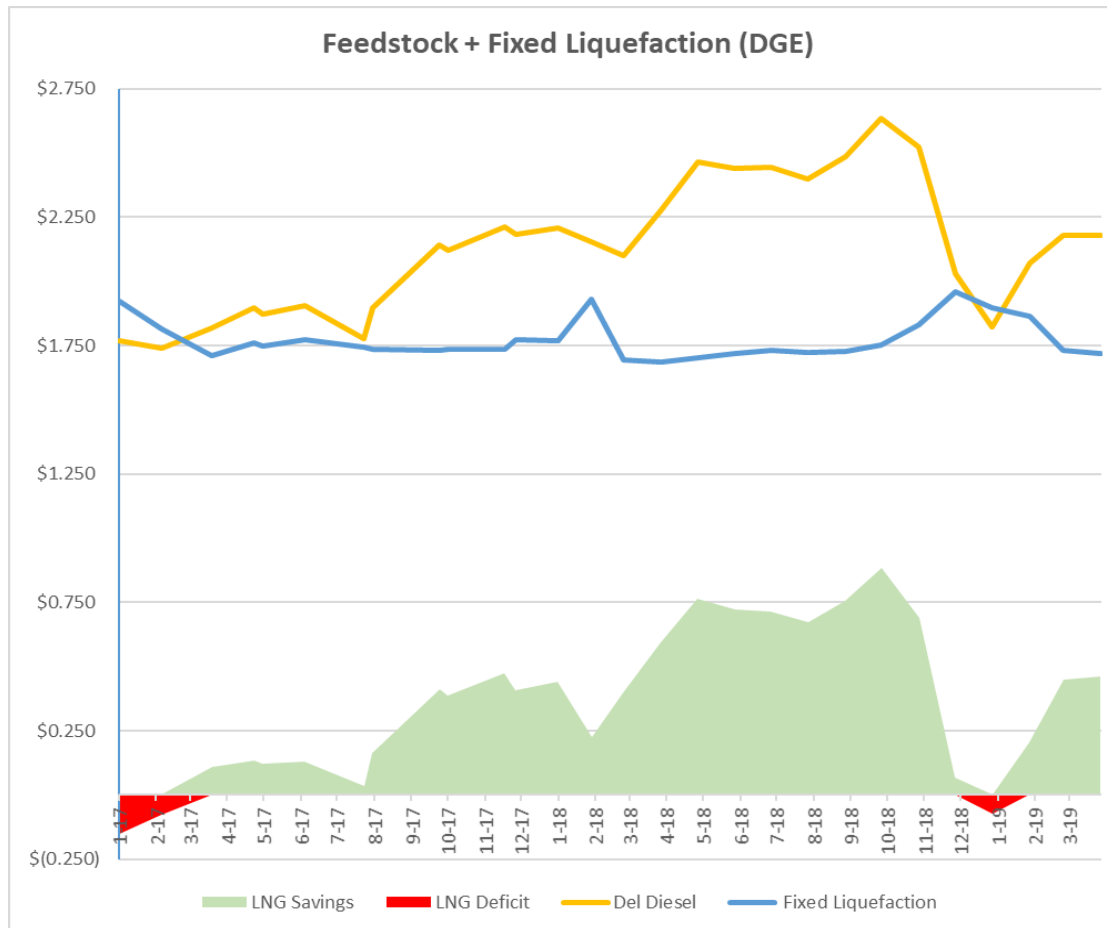
- Natural gas combustion produces 20-30% less CO₂ per unit of work delivered versus distillate fuels.
- Emissions of nitrogen oxides, a leading component to smog and ozone pollution, is reduced by 75% or more versus distillates.
- Particulate matter is reduced by over 90% in distillates and 99% as compared to propane
- Emissions of sulfur oxides are reduced by 50% or more as compared to distillate fuel combustion

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LNG – Stable Price vs #2 Diesel Fuel

Two Feedstocks

- #2 Diesel tracks with oil.
- LNG tracks with Natural Gas.



Feedstock (Nat Gas)	LNG DGE	Delivered Diesel	
\$ 3.104	\$ 1.775	\$ 2.126	Avg
\$ 2.460	\$ 1.686	\$ 1.740	Lo
\$ 4.430	\$ 1.959	\$ 2.634	Hi
0.542	0.0753	0.2579	Std Dev

* DGE = Diesel Gallon Equivalent



North Dakota LNG – The Company

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THE COMPANY

Headquartered in Tioga, North Dakota, North Dakota LNG is a producer and supplier of liquefied natural gas (LNG) targeting the drilling, fracking, industrial and transportation sectors of the unconventional oil and gas industry throughout the Williston Basin and Dakota's. A true end-to-end offering, North Dakota LNG provides turn-key alternative fuel solutions for customers at any point in the LNG logistics supply chain, resulting in lower costs and reduced environmental impact.

North Dakota LNG is capable of rapid response to unexpected challenges, events and opportunities. We believe that working with service providers should be simple, not complicated, strive to operate as an extension of our customers' teams.



ABOUT US

COMPANY STATISTICS

- \$40MM of investment
- 20 Tioga based employees
- Facility capacity in excess of 75,000 LNG gallons per day
- Past and Current customers:
 - 15 drilling rigs
 - 3 completed remote power generation projects
 - 6-9 frac water heating sites
 - BNSF rail pilot (Currently suspended)



Existing Oil and Gas Markets

- ▶ Drill Rigs - Diesel Engine with Bi-fuel System
 - Year around operation
 - Diesel engine with bi-fuel system for up to 70% diesel substitution
 - Rig boiler and heaters fueled by LNG in winter
 - Provides 'diesel-like' experience – LNG tank on pad, fuel added as required
- ▶ Frac Water Heating
 - Seasonal operation – heats water for mixing chemicals
 - LNG replaces propane and diesel
- ▶ Pipeline Outage Support
 - As needed to support infrastructure outages
 - LNG vaporized and injected into gas line
- ▶ Soil Remediation
 - As needed to support remediation work
 - LNG vaporized and burned to remove hydrocarbons from soil



Expansion – Oil and Gas + New



▶ Drill Rigs – Hybrid Generator Set

- Diesel performance with 100% natural gas
- Natural gas generator set operates within engine parameters
- Battery energy storage charges / discharges through load steps
- Same electrical and control connections
- Similar footprint to existing diesel gensets used on rigs today

▶ Frac Spread

- Partnership with FracShack: ND LNG – fuel supply, FracShack – fuel distribution
- Up to 70% diesel displacement
- Safe fuel distribution to pumper trucks

▶ Produced Water Clean-up / Recycling

- Partnership with Hydrus and Purestream
- Clean-up: LNG as fuel to evaporate. Concentrate to injection well.
- Recycling: LNG to power water recycling process. Concentrate to injection well

▶ Off-Pipe Communities

- Replace: Coal, Heavy Fuel Oil, Propane
- Food processing, Off-pipe communities

▶ Rail Export – LNG, Ethane, Other

- Canada, Asia, Texas, Midwest

Benefits to Bakken Operators and North Dakota

Operators in the Bakken realize fuel cost, emissions and Flare Credit benefits when consuming LNG.

Flare Credits, when utilized, allow additional production of oil, resulting in additional profits for the operator and tax revenue for North Dakota.



North Dakota LNG - LNG Production Benefits Bakken Operators and North Dakota

Year / Month	Avg Oil Price (\$/BBL)	LNG Production (LNGg)	MCF Credit	Additional Oil Production (BBL)*	Additional Operator Profit*	Additional Production Tax*
2018-10	\$ 70.16	732,800	59,097	59,097	\$2,196,036	\$ 207,311
2018-11	\$ 56.25	1,063,899	85,798	85,798	\$1,994,811	\$ 241,308
2018-12	\$ 49.16	1,510,987	121,854	121,854	\$1,969,157	\$ 299,517
2019-01	\$ 52.27	1,782,217	143,727	143,727	\$2,769,623	\$ 375,631
2019-02	\$ 54.98	1,567,712	126,428	126,428	\$2,778,896	\$ 347,552
2019-03	\$ 58.27	1,667,580	134,482	134,482	\$3,398,367	\$ 391,814

* Assumes additional oil production occurred in same month as credits acquired.

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Example: Benefit to Bakken Operator



- Diesel: \$2.45/gallon
- LNG: \$0.99/LNGgallon (Range will be \$0.99 - \$1.13/LNGg)
- 12 truck frac spread
- 2 frac spreads
- 50% diesel substitution
- \$60/BBL oil / \$29.00 Breakeven, GOR = 1
- Flare credits can be utilized
- Transition from using FracShack Diesel Fueler to FracShack DualFueler

LNG DEMAND / CO2 REDUCTION / FLARE CREDITS / FLARE CREDIT BENEFIT							
Application (Gas Oil Ratio = 1) (\$60 WTI, \$29 Breakeven)	Qty.	GPD ea. (approx.)	Total GPD (approx.)	Fuel Cost Reduction (\$)	CO2 Reduction (TPD)	Flare Credits (MCFD)	Flare Credit Benefit/day (\$)
Drill Rigs (50% Diesel Substitution)	-	-	-	\$ -	-	-	\$ -
Frac Spread(s) (12 Trucks per)	2	19,518	39,035	\$ (8,722)	(50)	1,574	\$ 42,498
Frac Water Heating (18 Wk Season)	-	-	-	\$ -	-	-	\$ -
Pad Power (100% LNG)	-	-	-	\$ -	-	-	\$ -
Total (Daily):			39,035	\$ (8,722)	(50)	1,574	\$ 42,498
			<u>Gal/Yr</u>	<u>Cost Red./Yr</u>	<u>Ton/Yr</u>	<u>MCF/Yr</u>	<u>\$/Yr</u>
Total (Annual):			13,115,833	\$ (2,930,567)	(16,770)	528,864	\$ 14,279,334



Our Facility and Product

ABOUT US

PRODUCTION CAPABILITIES

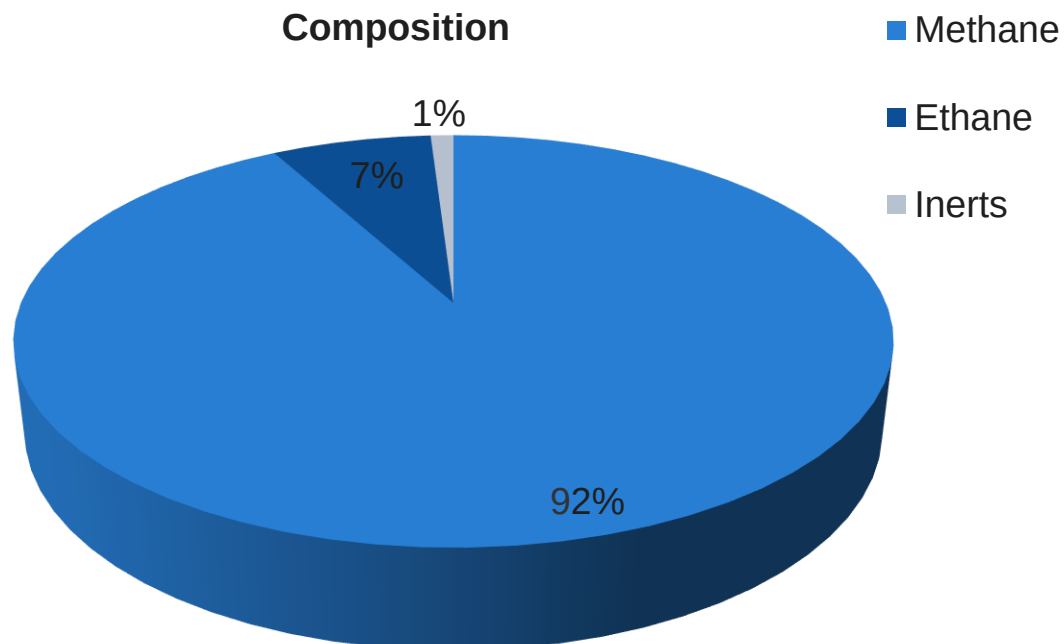


Highlights:

- Model is built for redundancy
- We have mobile equipment capable of storing an additional ~ 60,000 gallons/day

2018	Nameplate	
	LNG-g/day	Storage
Phase I	10,000	0
Phase II	66,000	120,000
Total LNG Supply/Day	76,000	120,000

NORTH DAKOTA LNG COMPOSITION



Quick Reference Chart					
	LBS/LNG gal	BTU/LNG-g	BTU/SCF	BTU Per diesel gallon	BTU Per Propane gallon
LNG	3.60	82,600	1,020	1.60	1.10



Installations, Applications, Delivery

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On-site LNG Storage with Remote Monitoring

Skid or Trailer Mounted

- Compact Footprint
- Multiple days of storage
- Ambient or Electric Vaporization
- Remote Monitoring



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EXAMPLES – LNG in Use



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LNG Delivery

Truck and trailer used for delivering LNG



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FLEET MONITORING – Real-time driver tracking

Real-time tracking of LNG delivery. Can share link with customer to track arrival.

← → ↻ 🏠 <https://cloud.samsara.com/devices/212014918368852/vehicle> 📖 ☆ ⚙️ 🔍 📄 ⋮

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1015 ⚙️

2019 KENWORTH T880

📍 51.5 mi ESE Williston, ND [Street View](#)

Current Driver Nathaniel Hester

Connected hotspot clients 0

VIN 1XKZD49XXKJ282975

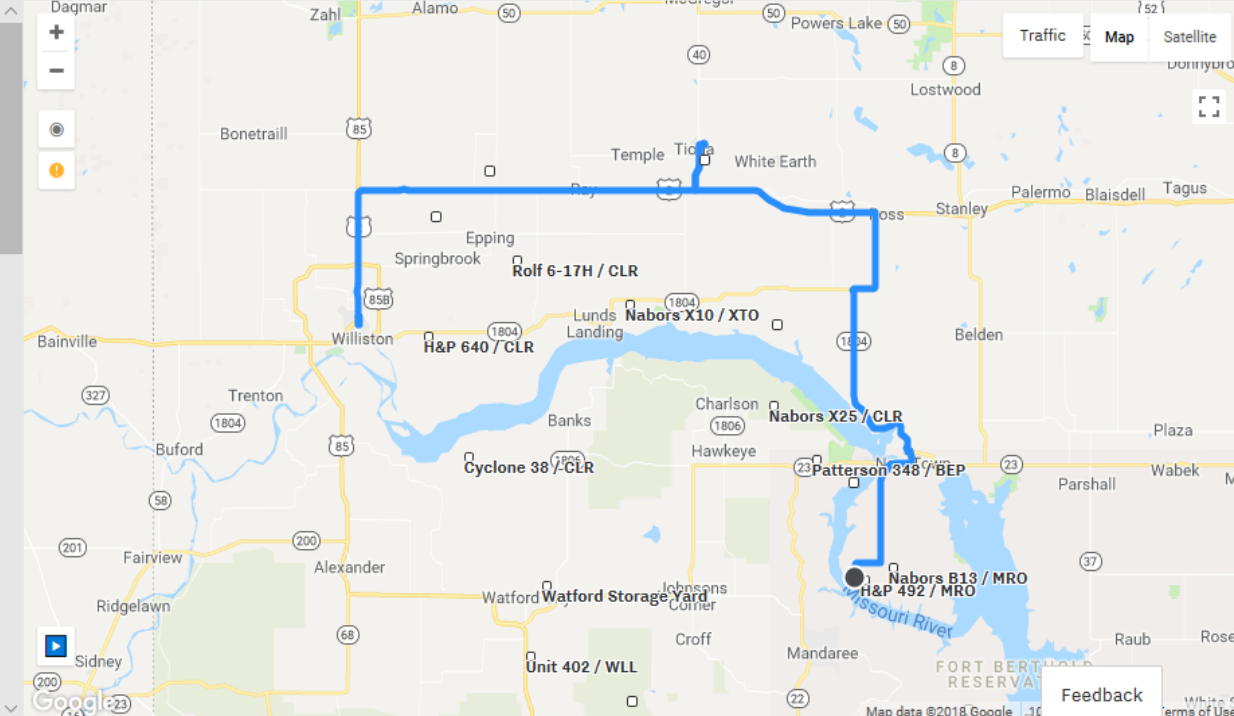
Fuel 81%

Engine check light Off

Odometer 5,261 mi

Engine Off

NOTE



Terminology

#2 Diesel Fuel Oil

- 1 gallon of #2 Diesel Fuel = 138,500 BTU
- 7.22 gallons/mmBTU
- 161.3 lbs CO₂/mmBTU

LNG

- 1 LNG gallon = 82,645 BTU
- 12.10 gallons/mmBTU
- 117 lbs CO₂/mmBTU
- 1.84 LNG gallons = 1 #6 Heating Oil Gallon Equivalent





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