

25 YEARS PROVIDING CLEAN COMBUSTION SOLUTIONS

GLOBAL RECOGNITION

Questor

Clear Solutions Clean Skies

Ms. Audrey Mascarenhas BAsC, M.Eng, FCAE
President and CEO





Jambi Merang - Indonesia



Loading - Canada



Well drilling, completions and production - Europe

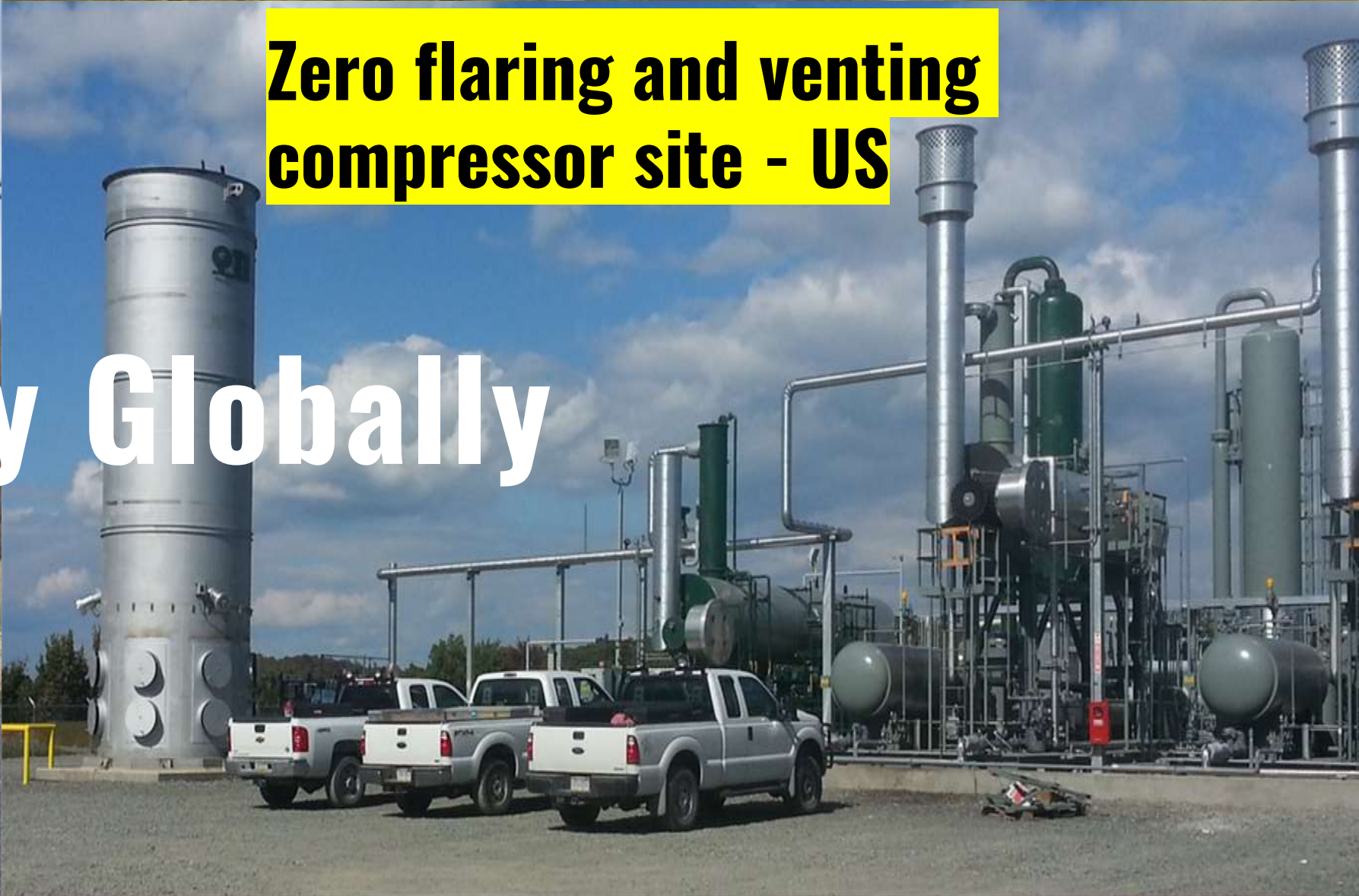
EUROPE



Zohr H₂S- Egypt



Dehy - US



Zero flaring and venting compressor site - US

Questor's History Globally

WHO WE ARE

Leaders in clean combustion and waste heat to power technology

Permanent installation



Portable unit



PUBLIC COMPANY

- Founded in 1995
- Public in 1998 on the TSX-V QST
- Patented clean air technology
- Grown from cash flow – cash in the bank, zero debt
- Revenue generated from sales, rentals and service

SUPERIOR TECHNOLOGY

- ISO certified 14034 > 99.99% combustion efficiency
- Safe and quiet = community acceptance
- Reliable equipment requiring minimal maintenance

PROVEN TRACK RECORD

- 25-years of providing global clean combustion solutions
- Performance recognized by regulators
- Global leader considered best in class - BACT
- Strong technical team with deep understanding of our clients' world

25+ YEARS OF EXPERIENCE

1000+ Q – SERIES PLACED WORLDWIDE

>99.99% Q – SERIES COMBUSTION EFFICIENCY



Questor portable thermal oxidizer operating in the middle of the community



WHAT WE DO

- **Questor's Q thermal oxidizers** cleanly combust all types of waste gas at 99.99% efficiency from many industries including Oil & Gas (Upstream, Midstream, Downstream, Distribution), Mining, Agriculture, Food Processing, Landfills, Biogas, Water Treatment, Bio-digestors, Syngas, Industrial process, Hydrogen production, RNG, etc.
- **Waste Heat utilization - Questor ORC units** convert low-grade waste heat to power from clean combustion of flared and vented gas, industrial process, engine exhaust, geothermal, glass recycling, cement plants, forestry wood waste, etc.
- Our solutions deliver regulatory compliance eliminating GHG, HAP's, VOC's, NOx, H₂S, and methane emissions, and **Q-Data** verifies this
- We are recognized globally for our **H₂S expertise**



HOW WE SERVE



EMISSION REGULATION

VOCs, HAPs, Methane, GHG emissions

Methane is 86x worse than CO₂ from a GHG warming perspective



COMMUNITY & ESG INITIATIVES

Community acceptance, ESG initiatives



COST REDUCTION

Reduced operational, safety and capital costs

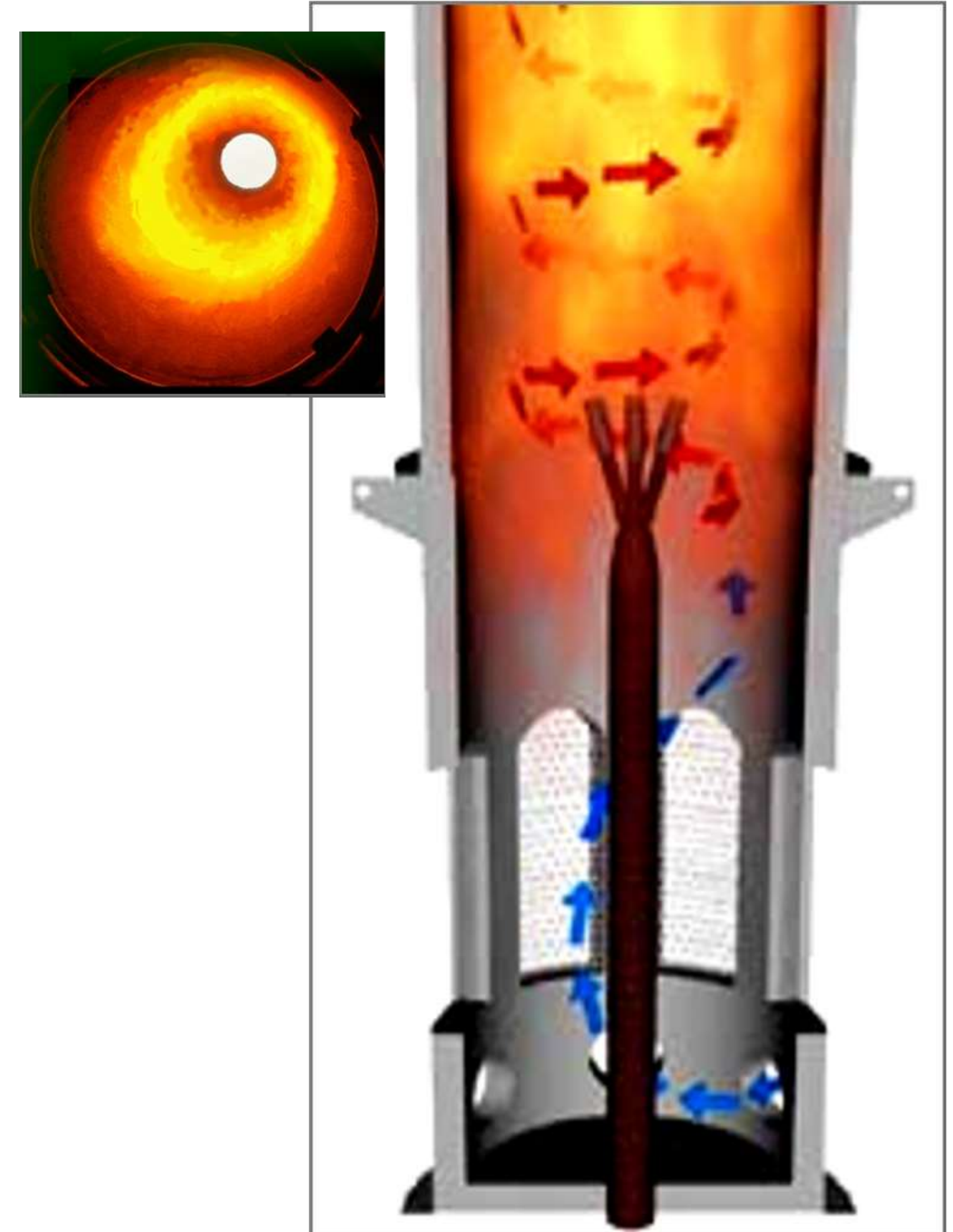


ENERGY EFFICIENCY

Power generation from waste heat, reduce op costs, reduced diesel usage

OUR PATENTED PROCESS

- Natural draft system; no fans, blowers, or costly and/or noisy generators needed
- No external power required; BMS runs on solar
- Air naturally induced without the use of blowers
- Induces all other low-pressure streams (e.g. tank vapors without the need for a VRU) with minimal back pressure
- A single unit handles both Low-pressure and High-pressure streams



PROVEN PERFORMANCE

NORTH DAKOTA FIELD TESTING



Combustor	Parameter	Test Result				Average
		Test 1	Test 2	Test 3	Test 4	
SITE 1 Q5000-17-164 (west)	VOC DRE %	99.997%	99.998%	100%	100%	100%
	NOx (lb/MMBtu)	0.158	0.200	0.233	0.232	0.206
	CO (lb/MMBtu)	0.110	0.074	0.017	0.067	0.067
	Stack Temperature (°F)	1125	1412	1649	1823	1502
SITE 1 Q5000-17-173 (west)	VOC DRE %	100%	100%	100%	100%	100%
	NOx (lb/MMBtu)	0.140	0.182	0.220	0.287	0.207
	CO (lb/MMBtu)	0.049	0.008	0.002	0.011	0.018
	Stack Temperature (°F)	1046	1348	1522	1852	1442

Combustor	Parameter	Test 1	Test 2	VERIFIED ISO 14034	Average
		Test 1	Test 2		
SITE 2 Q5000-17-183 (east)	VOC DRE %	100%	100%		100%
	NOx (lb/MMBtu)	0.279	0.258		0.263
	CO (lb/MMBtu)	0.001	0.002		0.001
	Stack Temperature (°F)	1758	1860		1792
SITE 2 Q5000-17-173 (west)	VOC DRE %	100%	100%	100%	100%
	NOx (lb/MMBtu)	0.244	0.279	0.281	0.268
	CO (lb/MMBtu)	0.002	0.004	0.002	0.003
	Stack Temperature (°F)	1743	1763	1775	1760

Combustor	Parameter	Test 1	Test 2	Test 3	Average
		Test 1	Test 2	Test 3	
SITE 3 Q5000-17-123 (east)	VOC DRE %	100%	100%	100%	100%
	NOx (lb/MMBtu)	0.178	0.173	0.202	0.184
	CO (lb/MMBtu)	0.092	0.013	0.005	0.037
	Stack Temperature (°F)	1737	1706	1688	1710
SITE 3 Q5000-17-164 (west)	VOC DRE %	100%	100%	100%	100%
	NOx (lb/MMBtu)	0.205	0.198	0.204	0.202
	CO (lb/MMBtu)	0.046	0.049	0.042	0.046
	Stack Temperature (°F)	1735	1754.000	1745	1745

SHELL TESTING 2000

- Shell 29 Limestone 14-2-33-10 W5M
- 11% H₂S – Q5000
- 99.99% Combustion efficiency at 2.5 and 4.8MMscf/d with 100% excess air
- Plume rise of over 400 meters
- SO₂ dispersion from 40ft combustion stack equivalent to a 110ft flare operating at 98% efficiency. No ground level violations of SO₂ or H₂S

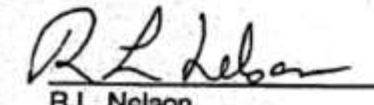
Mr. Kim Eastlick
 Facilities Division
 Environment Safety & Technical Services
 Alberta Energy and Utilities Board

20 March, 2000

Regarding: Portable Incinerator Test
 Shell 29 Limestone 14-2-33-10W5m
 Jan 25, 2000/03/04

Attached are the findings of the Portable incinerator test conducted by Shell Canada Limited in conjunction with Norward Energy Services, the owner of the incinerator, and Questor Technologies, the manufacturer of the incinerator.

Yours truly,



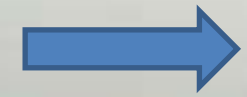
R.L. Nelson
 Drilling and Production Engineering Advisor

TRS DESTRUCTION EFFICIENCIES (as Sulphur) @126 E3m3/day				
(total in - ppmv as Sulphur)	105100	106900	99800	103900
(total out - ppmv as Sulphur)	<4.0	<4.0	<4.0	<4.0
(% efficiency)	>99.9962	>99.9963	>99.9960	>99.9962
Taking into account intake air dilution	99.9	99.9	99.9	
GASEOUS ORGANICS DESTRUCTION EFFICIENCIES (as CH ₄) @ 126 E3m3/day				
(total in - ppmv as Methane)	828102	821376	818214	822564
(total out - ppmv as Methane)	<36.4	<38.4	<185.8	<86.9
(% efficiency)	>99.9956	>99.9953	>99.9773	>99.9894



100MMSCF/D SOUR GAS PROCESSING PLANT

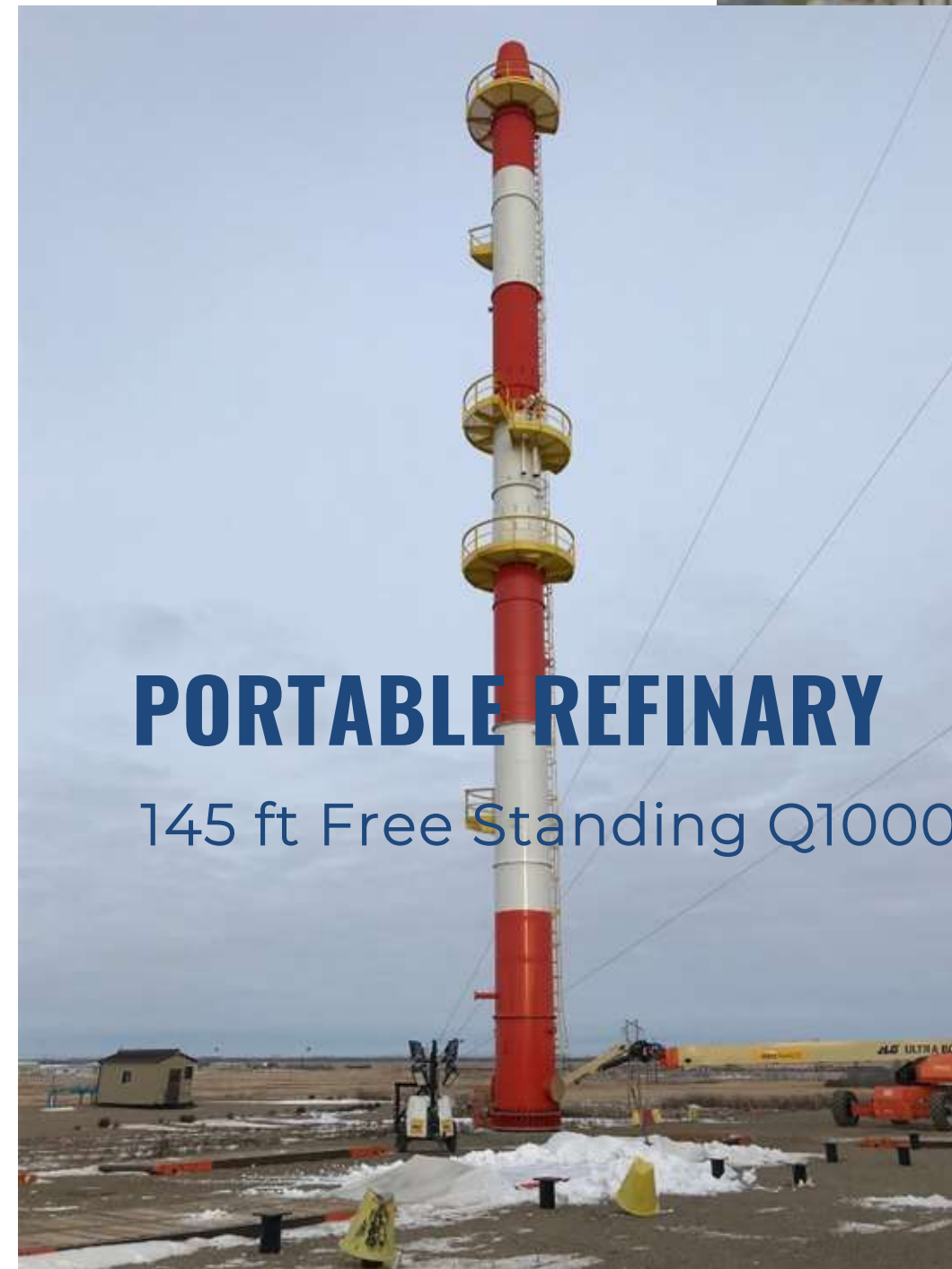
Questor tall stack for H₂S destruction and SO₂ dispersion



TALL STACKS FOR SO₂

EXTENSIVE GLOBAL SOUR GAS EXPERTISE

- **50% lower capital cost**
- **50% Reduction in fuel gas**
- **No blower**
- **Minimal maintenance**
- **Simplicity of operation**
- **Superior SO₂ dispersion**
- **40ft – 335ft**



PORTABLE REFINERY

145 ft Free Standing Q1000



INNOVATIVE SOLUTIONS

GLYCOL DEHYDRATION


- Still column vapors directly piped in
- Close spacing enables a small footprint and significant cost reductions
- Eliminates condensing, storage, transportation and disposal of water
- Minimal fuel gas usage
- Guaranteed zero BTEX emissions



BEST PRACTICES

Best available combustion technology (BACT)

5.6.1 Dominion is specifying a Questor brand flare/incinerator for all glycol dehydration plants, and must be included as the base proposal.

	Specification	Spec. No.	14
	For	Template Rev. No.	6
	Glycol Dehydration Unit	Rev. Date	03/01/2013

scenario. Sight glass connections and high/low level switch connection on the surge are to make maximum use of the height of the surge tank, with as much gap between switch levels as possible. Sight glass visible range must include the switch level to provide accurate setting and confirmation of the switches.

- 5.5.13 There shall be clean out and drain connections on both the reboiler and the surge tanks. For an in-line design which incorporates a weir, there will be one 12" nozzle on either side of and very close to the weir at or near the top, and a 12" drain at the opposite end of each compartment, preferably on the bottom of the head. For over-under designs, the reboiler shall have the top clean out at one end and with drain on opposite end; and the surge shall have the top clean out at approximately a 10:30 position with opposite end clean out, preferably on the bottom of the head. These connections are to be flanged with blinds.
- 5.5.14 TEG temperature in the reboiler shall be controlled by the PLC and shall not exceed 380 °F at maximum load.

5.6 FLARE / INCINERATOR

- 5.6.1 Dominion is specifying a Questor brand flare / incinerator for all glycol dehydration plants, and must be included as the base proposal. Alternatives may be considered.
- 5.6.2 The flare/incinerator shall, as a minimum, provide 90% destruction efficiency.
- 5.6.3 If a higher degree of vapor treatment is necessary, a thermal oxidizer may be necessary. Refer to Appendix 13.1 for specific requirements.
- 5.6.4 In the still column vent and ahead of the flare inlet shall be a vapor preheater to further minimize the condensation of water and distillate vapors. This preheater shall be positioned within the reboiler stack, shall be stainless steel, and will be field-insulated.
- 5.6.5 A flame arrestor shall be installed in the still outlet pipe ahead of the flare / incinerator and shall be in a vertical position. A relief valve shall be added at the reboiler to prevent overpressure of the reboiler should the flame arrestor become clogged.
- 5.6.6 Ahead of the flare / incinerator and the flame arrestor shall be a vessel or tank (commonly called a blowcase) to collect fluids that may condense under prestart conditions or upset conditions. This vessel shall permit automated pressurized blowing of captured liquids to Owner's remote liquids storage tank. Provide with proposal the anticipated operation logic for this blow tank. All level switches, manual valves, and solenoids for this are to be supplied by Vendor. Include in the outlet piping for this blowcase a quality soft-seat check valve ahead of a solenoid valve (to minimize the possibility of downstream pressure from getting back into the blowcase), ahead of the manual valve. Include with the blowcase an automated vent valve to relief residual

Filename: (In File Net)	Last Revised:	Page Number
14 Glycol Dehydration Unit spec. doc.	03/01/2013	10 of 35



PIPELINE AND PLANT MAINTENANCE - VENTED BLOWDOWNS



Incineration of Methane Emissions

Research and Development

Incineration of Methane Emissions

TransCanada has twice successfully tested a methane incinerator further increasing our ability to minimize the greenhouse gas (GHG) impacts of blowdowns. A blowdown is when methane is emptied from pipelines for construction and maintenance. Using a portable incinerator allows TransCanada to burn off residual methane left in pipelines after the use of air-powered expellers. Combustion converts methane to carbon dioxide, reducing its GHG impact by roughly 80 per cent. Methane is 21 times more potent than carbon dioxide over a 100 year time period in the atmosphere. Approximately 24 per cent of TransCanada's methane emissions are from blowdowns. Combusting methane reduces TransCanada's greenhouse gas emissions.



Caron Compressor Station

November, 2002



In the test Compressor Station 13, near Moose Jaw, Saskatchewan, portable transfer compressors were used to pulldown natural gas in the pipeline. In normal circumstances, the remaining gas would have been released into the atmosphere. In this case an incinerator was used to combust the remaining gas.

Herbert Compressor Station

May, 2003



The second incineration trial took place at Herbert Compressor Station, near Swift Current, Saskatchewan. Maintenance was required to install a new pig receiver at a mainline pipe section. Incineration of residual methane gas was carried out after the completion of transfer compression.

In both pilot tests Questor technology's portable incinerator was used. In each case approximately 75 per cent of the remaining gas was incinerated. Questor incinerators use a vortex combustion system to achieve 99 per cent combustion efficiency.

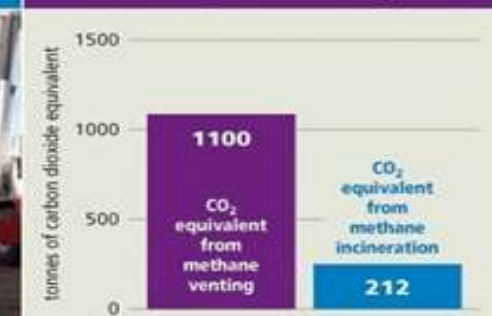
Each Incineration:

- Reduced emissions by approximately 1100 tonnes of carbon dioxide equivalent
- Produced approximately 212 tonnes of carbon dioxide emissions from combustion
- Incinerated approximately 2.93 million cubic feet of gas
- Approximately 3.11 million cubic feet of gas remained in the lines after transfer compression

Methane Incineration for both tests was equivalent to:

- Taking 209 cars off the highway
- Heating 10 homes for one year
- Planting 1,337 lodge pine trees

GHG Emission Comparison with and without Incineration after Transfer Compression



Community, Safety and Environment
Climate Change Group

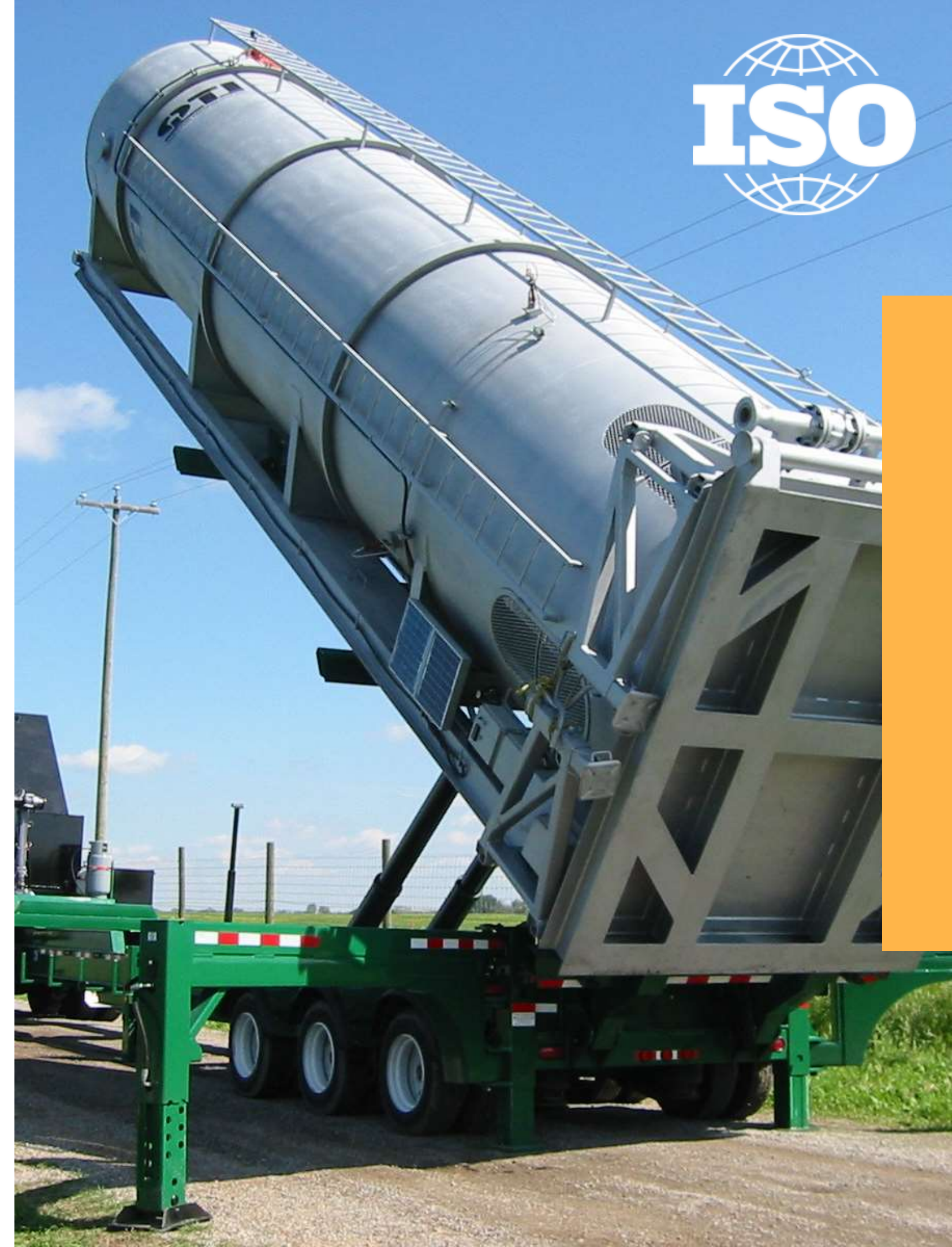
Contact: Hasan Imran phone: 403.920.7270
email: hasan_imran@transcanada.com



PORTABLE AND EASY SETUP

SET IT AND FORGET IT

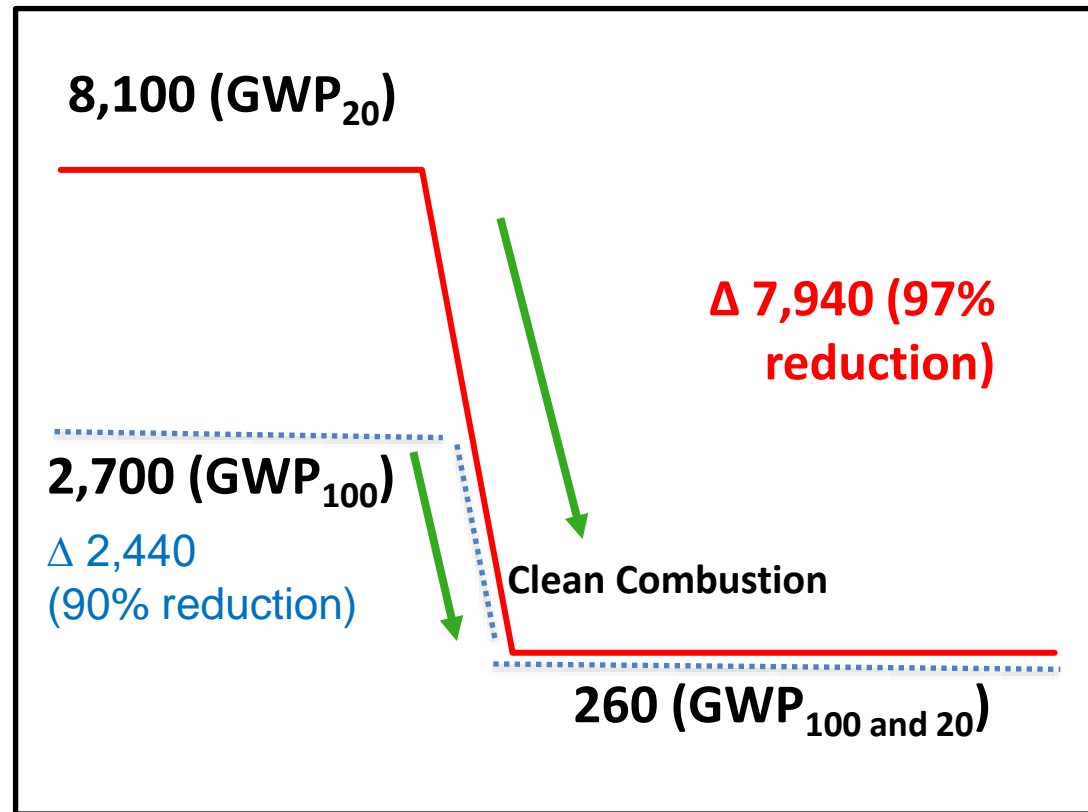
- Patented Hydraulic trailer
- Setup and takedown in less than 10 minutes
- Detachable trailer
- Eliminates crane and pickup costs
- Improved safety
- Over 120-unit rental fleet



NON-ROUTINE AND MAINTENANCE OPERATIONS

Questor unit eliminating the venting of 5MMSCF/D Methane

\$0.10 / tCO₂e



tonne CO₂e/day



**PIPELINE BLOWDOWN – COLLEGE STATION, TX.
5MMSCF/D**

Methane:

— GWP₂₀ = 84 tonne CO₂e

..... GWP₁₀₀ = 28 tonne CO₂e

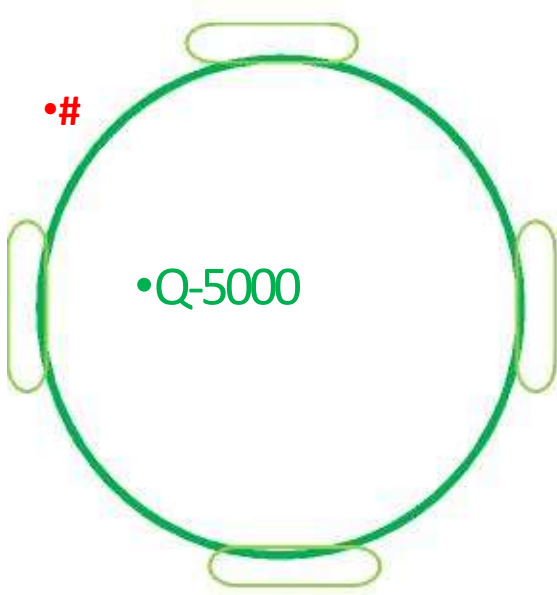
Ref: (IPCC-AR5)

•Metal Building 40' Away



•Victoria Avenue Location

•Vent Door



•Q-5000

•#

•*

•10'

•20'

•30'

•40'

•50'

•80'

•100'

•83dB

•76dB

•72dB

•69dB

•66dB

•65dB

•64dB

Sound – dB Measurements Taken From 10' to 100' From Enclosed Flare

•Victoria Avenue

Note: At 80' & 100' the actual road, traffic noise was louder than the Enclosed Flare System

Temperature Readings:
#Side of Q5000 – 182F Deg.
*Vent Door on Q5000 – 565F Deg.

≠ Side of Building, @ 40' away was 10F Deg. Above Ambient



LOW GROUND HEAT RADIATION



SAFETY

- Facility integration
- Personnel safety
- No harmful pollutions emitted
- H₂S safety

MINIMAL GROUND LEVEL HEAT RADIATION

- Low forest fire risk
- Permafrost protection
- Air intakes can be flash arrested
- No water curtain need

ZERO FLARING AND VENTING FACILITIES

One unit can handle multiple streams of varying pressures



COMPRESSOR STATION - NEW YORK STATE

Non-Routine and Maintenance

- Maintenance – pipeline, engines,
- Pipeline blowdowns and pigging
- Soft starts
- Equipment failure

Routine Process

Dehy Still Column, Tank, Amine, Process Units, PSV's, etc.

DRILLING, COMPLETIONS AND PRODUCTION



**EARLY PRODUCTION FACILITY
DENVER, COLORADO**

ALL GAS TIED IN

- High capacity - 5MMscf/d methane eq. per unit
- 99.99% guaranteed combustion efficiency
- No black smoke, odors, or visible flame and compliant sound

TYPICAL GAS SOURCE TIED IN

- Wellbore gases from HP and LP separation
- Liquid storage tanks
- Truck-out vapors
- The single unit handles multiple streams with varying pressures and flowrates

DESIGN AND TESTING

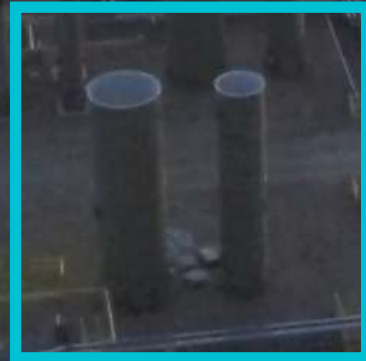
- Sturdy portable design; Hydraulic trailer
- TX, CO, PA, CA, NM Basin tested and proven
- Sales and rental units available



STRANDED GAS – E&P FACILITIES



Rental Unit



Production Unit

44 WELL PAD SITE IN COLORADO

- 30% reduction in lease size
- 25% reduction in pad cost
- Regulator recognition of 99.99% efficiency
- Incremental 400 bbls/d production
- \$20,000 revenue/d production

ADVANTAGES OF THE ENCLOSED CLEAN COMBUSTION TECHNOLOGY



HEAT EASILY TRANSFERRED

- ✓ Directly with an internal heating coil
- ✓ Slip stream of flue gas

PROCESS HEAT OR WATER EVAPORATION

Opportunity to utilize the Heat;

- ✓ Process heat
- ✓ Break the oil/water emulsion
- ✓ Produced water evaporation
- ✓ Power generation

Post combustion gas capture for Carbon Capture, Utilization or Storage (CCUS)



GREEN CLEAN POWER FROM WASTE GAS



Oil Battery - Mexico

HARNESS HEAT

- **Harness the heat from our combustion unit**
- **Heat from boilers and engine flue gas**
- **Other process streams**
- **Large quantity of low-grade heat currently wasted**

SUPERIOR TECHNOLOGY

- **Zero emissions green power**
- **Consistent operation (Available 24/7)**
- **Small footprint**
- **Simple battery (hot water tank)**
- **No rare earth minerals needed**



CPS ORC TECHNICAL SPECIFICATIONS

CPS MODEL	50-100	200	500	1000	1500
Thermal Input kW	650	1200	2600	5200	7400
Thermal input MBtu/hr	2210	4100	8890	17700	25200
Gross Electrical Power Output (kW)	50-100	200	500	1000	1500
Gross Thermal Input Required from incinerator (MBtu/hr)*	3200	6500	15000	30000	42000
NG Flow Rate to provide thermal input (MCF/D)**	60	125	250	500	800
Working Fluid	ENVIRONMENTALLY FRIENDLY ORGANIC FLUID				

* Assumes 60% of thermal energy from the incinerator is transferred to the ORC system

** Assumes heating value of the gas = 1000 BTU/SCF and flue gas exit temperature is 200C at the heat recovery exchanger

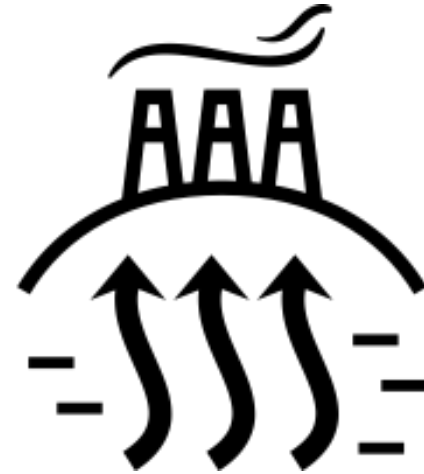
SOURCES OF LOW-GRADE WASTE HEAT



Industrial Waste Heat



Biomass



Geothermal



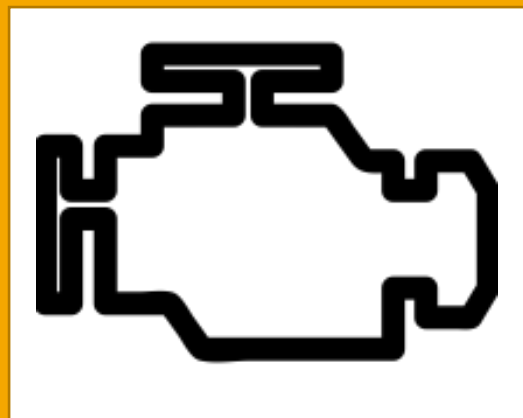
Solar



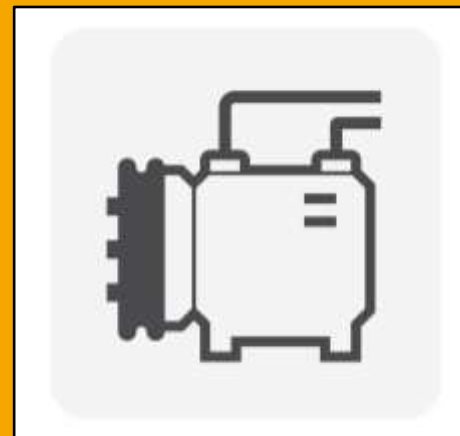
Landfill Waste



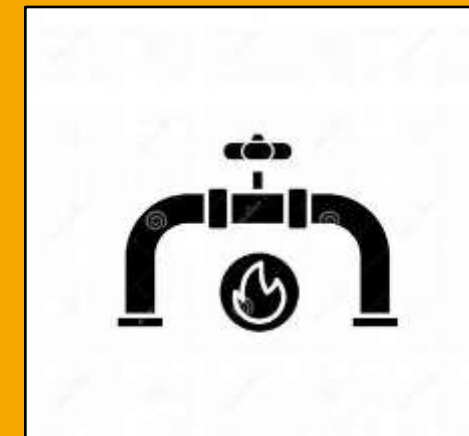
Questor Clean Waste Gas Combustion Technology



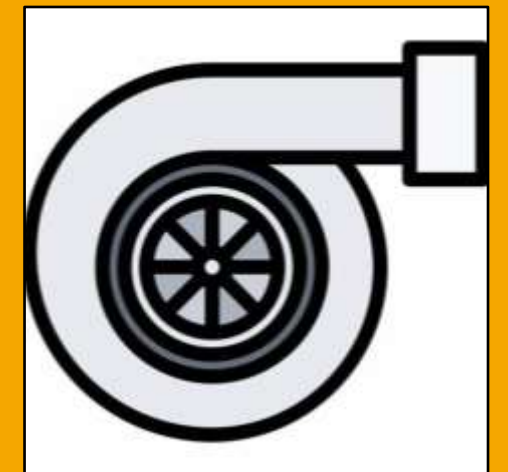
Reciprocating Engines



Boilers



Process Fluids



Gas Turbine

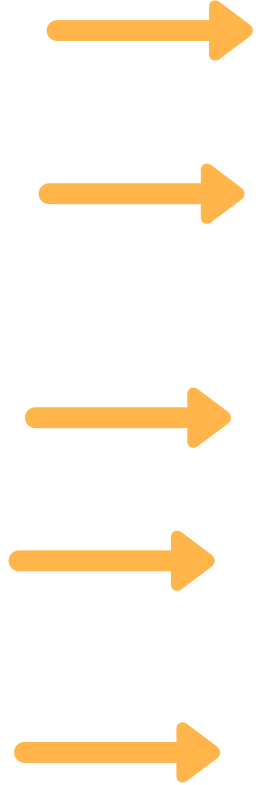
CONTINUOUS EMISSIONS MONITORING



Detection with Drones, Satellite, Hand helds and fixed monitors

G A S E M I S S I O N D E T E C T I O N

- BTEX
- HAP's
- VOC's
- Methane
- Hydrogen Sulphide



Q U E S T O R

- Questor Unit Sensors monitor
- Pressure
- Flow
- Temperature
- BMS
- Pilot Status
- Predictive Emissions monitoring



Transmitting on 30-sec intervals



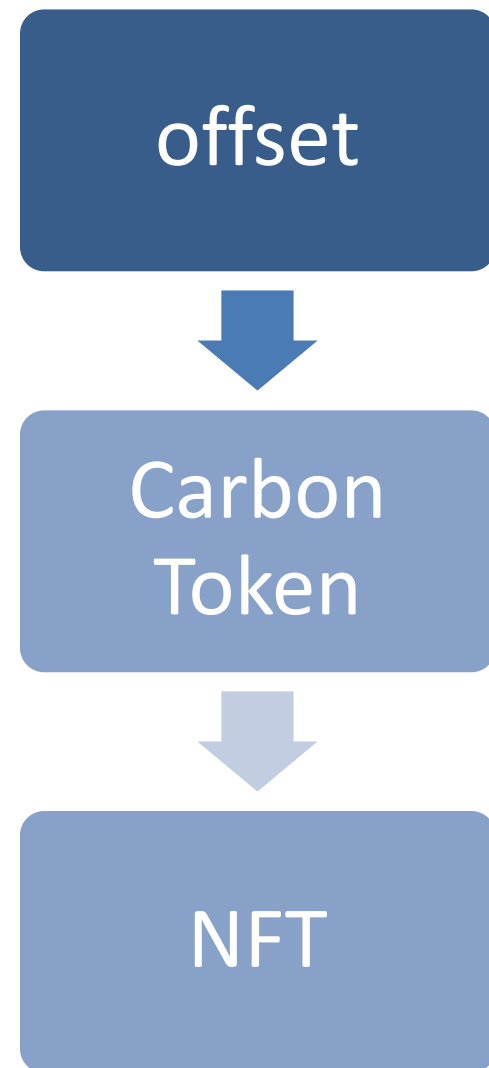
Continuous monitoring for zero emissions using drones



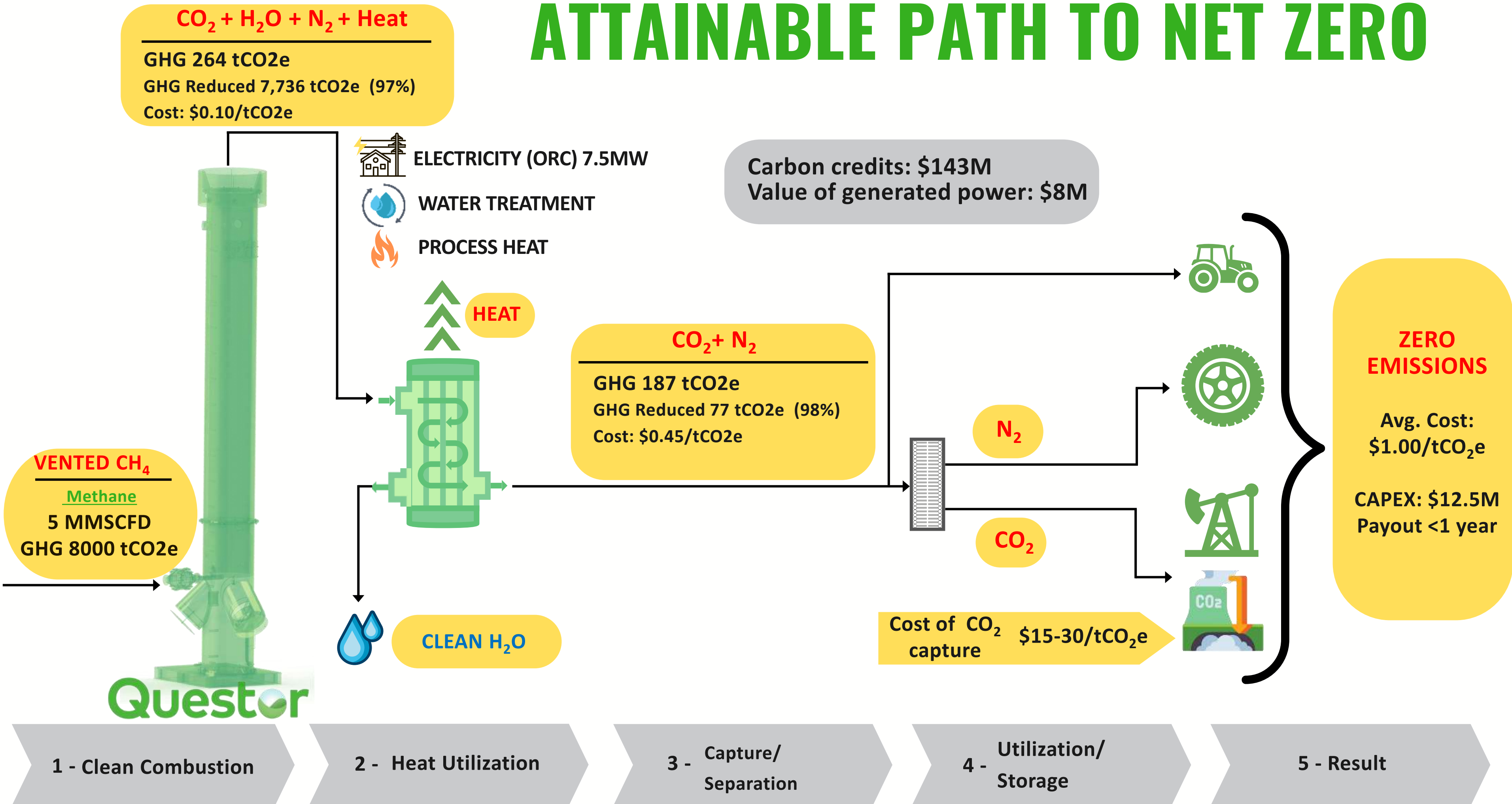
Emissions Excellence Center

DIGITAL CARBON MARKET TOKEN CREDITS

Where transparent data proves real monetizable emission reductions



ATTAINABLE PATH TO NET ZERO



NET ZERO AT AN OIL BATTERY



Assumptions:

- Gas composition: C_1 : 80%, (based on a real case)
- GWP of methane: 28
- Electricity Grid Displacement Factor: $0.57 \text{ tCO}_2\text{e}/\text{MWh}$ (ref: AEP, Carbon Offset Emissions Factor Handbook-2019)

- 300 mscf/d flared at 95% efficiency
- Cleanly combusting the gas at 100% efficiency reduces GHG emissions $2190 \text{ tCO}_2\text{e}/\text{yr}$.
- Generate 200kW from the waste heat reduces GHG emissions $1000 \text{ t CO}_2\text{e}/\text{yr}$. At $\$0.08/\text{kWh}$ this generates a revenue of $\$140\text{k}/\text{yr}$.
- Assuming a 10-year project life
 - Capital $\$1\text{MM}$
 - Revenue $\$1.4\text{MM}$
 - $31,900 \text{ t CO}_2\text{e}$ reduced at 0 to $-\$13/\text{t}$
- Assuming a carbon offset is worth $\$50/\text{t}$ – $\$1.6\text{MM}$ or $>100\%$ ROI



COMMUNITY IMPACT



NEWS AND

Silently sour

Extensive planning helped Nexen complete a sour gas well workover on Calgary's outskirts virtually unnoticed

WITH THE RECENT GAS LEAKS west of Edmonton, the idea of sour gas makes many people very anxious. So when it comes to a sour gas well workover, no news is good news.

In late October 2004, Nexen Canada Ltd. moved a service rig on to its sour gas wellsite facility, located on the east side of 84 Street NE just north of 16 Avenue NE, to complete maintenance on the well.

Nexen had suspended and isolated the wellsite in October 2003 following a routine inspection that identified a maintenance requirement. The workover entailed inspecting the casing, running new production tubing and sub-surface safety landing nipple and valve to ensure the continued safe operation of

weather conditions. Using current weather conditions, we knew where the H2S or SO2 plume would travel." The use of the Questor Incinerator for combusting the sour gases (35 per cent H2S) vented from the well and the inclusive method that Nexen used when planning the project allowed for smooth passage of the workover with the EUB, the City of Calgary, the Municipal District of Rockyview and the many residential stakeholders.

"We used Questor because of the quality of the units. They're the most effective with almost 100 per cent efficiency in burning all the gas off. It's a proven unit," said Seredynski.

Although no sour gas was released during the workover,

"We used Questor because of the quality of the units. They're the most effective with almost 100 percent efficiency in burning all the gas off. It's a proven unit"

- Seredynski, Nexen

Compton Petroleum Corporation
Suite 3100, 150-6 Avenue SW
Petro Canada Centre, West Tower
Calgary, Alberta
T2P 3Y7

June 13, 2001

To Whom It May Concern:

I live one kilometer downwind of a natural gas plant owned by Compton Petroleum. When this company wanted to expand their operations and applied for a permit to incinerate sour gas I was concerned about air quality and bad smells that may result. Now after several months of operations, I can say that I have never detected any smells from the plant from where I live.

The noise level coming from the plant is such that I can hear it while outside at night if I listen for it, but it is not at a level that would bother anything. I am unable to hear the plant while in the house. The noise might be comparable to that of a large farm tractor working the same distance away - one-kilometer.

Compton is monitoring air quality in the area on an ongoing basis.

Thank you,

Nelson Ferris
Hines Creek, Alberta

"I live one kilometer downwind of a natural gas plant owned by Compton Petroleum. When this company wanted to expand their operations and applied for a permit to incinerate sour gas I was concerned about air quality and bad smells that may result. Not after several months of operations can say that I have never detected any smells from the plant where I live"

- Nelson Ferris, Hines Creek, Alberta



WPX Energy
@WPXEnergy

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Nexen in Calgary - 34% H₂S

Compton in Northern Alberta

WPX New Mexico





Clear Solutions. Clean Skies

PRESENTER

Audrey Mascarenhas
President and CEO

1 (403) 539 4369
amascarenhas@questortech.com



QUICK UPLOAD



MORE INFORMATION

www.questortech.com



CONTACT INFORMATION

140 4 Ave SW #2240, Calgary, Alberta, Canada

1 (844) 477-8669
netzero@questortech.com