

***Clean Skies  
with a Clear  
Conscience***

**Audrey Mascarenhas**



**CGEF Conference**

**September 28<sup>th</sup>, 2017**

**Calgary, AB**

# Today's Challenges

- Low commodity prices
- Facing enormous public opposition to industry activity especially toward fracking
- Public Health and Safety concerns
- Stringent emission rules worldwide
  - ✓ **US**; Clear Air Act - Benzene, Volatile Organic Compounds, Particulates and – EPA Quad “0” 95% efficiency
- Climate change and air quality concerns
- Demand for sustainable development



# Conversations Today

- Polarizing conversations
- Climate change is a hoax
- Can we meet the methane reduction target?
- We have to choose between Energy and Environment. Cannot have both
- We will be uncompetitive if....
- Vested Interests.....

# What is our Energy Future?

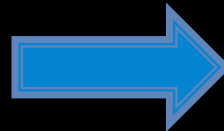
- Alberta's Energy futures Lab
  - 40 fellows with a common vision
  - Collaboration
  - System approach
  - Low hanging fruit, medium opportunities, moonshots



# The Colorado's Journey

- Oil and Gas activity occurring within communities
- Requests for moratoriums
- Air Quality issues – Non attainment zones
- EPA and State regulations on emissions
- 85% of the States revenue came from O&G
- Needed to create a win-win

# The Problem that needed Solving 'concentrated in the newer tight oil plays'



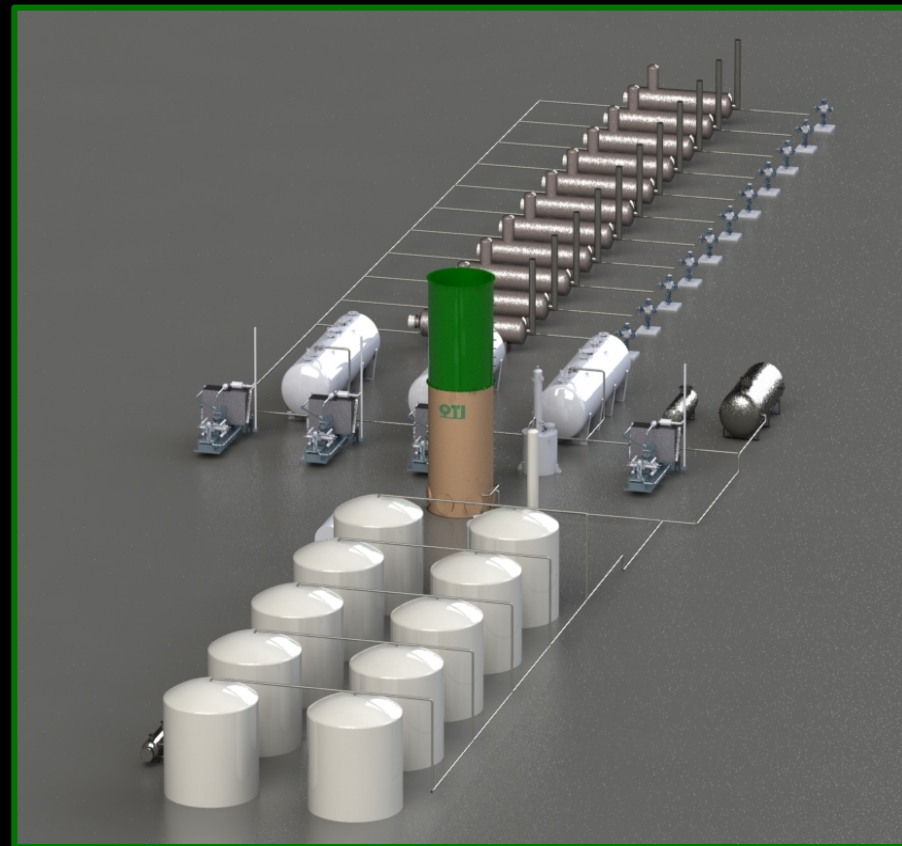
## Drivers

***Regulation; VOC, HAP's, methane, air quality, GHG emissions, low carbon operations, green or closed loop completions, no flaring***

***Community acceptance; Potential to reduce costs***

# Colorado Hybrid Rental / Sales Model

- **Reduced Costs by 15 - 20% and footprint by 30%**
- **Integrated complete total system solution**
- **Tall unit for flow-backs and high initial production rates**
- **Rented top of stack removed for permanent production**
- **Unit handles all the gas streams on site - closed loop**
- **Colorado “Hub”**



*“Renting Tops and Selling Bottoms”*



# 22 Well Pad Site – Colorado

- ✓ 30% reduction in lease size
- ✓ 20% reduction in pad costs



# Air Quality and GHG emissions



# Combustion of Hydrocarbons



99.99% efficiency requires the right mixture of fuel and air

Poor combustion results in the creation of:

- ✓  $\text{CH}_4$ , CO, black carbon soot particulates
- ✓ Over 250 compounds
- ✓ Volatile organic hydrocarbons or VOC's - benzene
- ✓ Sulfur compounds -  $\text{H}_2\text{S}$ , carbon disulfides, mercaptans

# Greenhouse Gas Emissions

- The Global Warming Potential (GWP) of methane is 25 times higher than that of CO<sub>2</sub> and therefore inefficient combustion increases the greenhouse gases emitted
- For example: 16,000 sft<sup>3</sup>/d (mscfd) of waste methane gas generates the following CO<sub>2</sub> emissions:

	<u>T/d</u>	<u>T/yr</u>
▪ Vented	<b>9.1</b>	3,325
▪ 65% combustion efficiency	<b>3.8</b>	1,400
▪ 80% combustion efficiency	<b>2.6</b>	960
▪ 100% combustion efficiency	<b>1.0</b>	365

# GHG Reduction

Carbon offsets are generated through the incineration of natural gas  
Instead of a routine pipeline venting

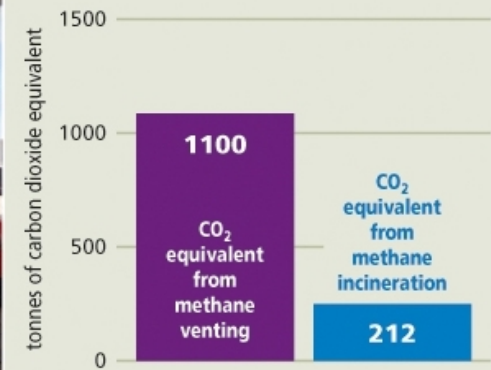
## Each Incineration:

- 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:



## GHG Emission Comparison with and without Incineration after Transfer Compression



Community, Safety and Environment  
*Climate Change Group*

Contact: Hasan Imran phone: 403.920.7270  
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# Gas Flaring

Gas flaring and Venting is a worldwide problem

## Facts

- 14.5 billion ft<sup>3</sup>/day
- Energy equivalent of 2.5 MMbbls/d of oil wasted
- 13% of the US total daily oil consumption
- 1 billion tonnes of CO<sub>2</sub>e emitted if combusted at 65% efficiency
- 2% world GHG emissions

## Consequences

- Air quality
  - pollutants and particulates
- Human health
- Environment
- Wasted energy
- Carbon footprint
- Odor and visibility

If this gas was cleanly combusted the GHG emissions from flaring would be reduced by 74%

# NEXEN in Calgary 34 % H<sub>2</sub>S

“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.

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In late October 2003, 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, for complete maintenance on the well.

Nexen had suspended and isolated the wellsite in late 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

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.

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Although no sour gas was released during the workover,

**Questor Technology Inc.**  
Portable Well Test Incinerator  
3,000,000 scf/day  
Working on 34% H<sub>2</sub>S Well Near Calgary  
Phone: (403) 571-1530





**No concerns with 34% H<sub>2</sub>S**  
**Calgary, 2012**



Compton Petroleum Corporation  
Suite 3100, 150-6 Avenue SW

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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.

To Whom It May Concern:

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The noise level comes from the plant while in the house working the same day.  
Compton is monitoring the noise level outside the house.

Thank you,  
*Nelson Ferris*  
Nelson Ferris  
Hines Creek, Alberta

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**Social License**

# Oil and Gas Well Completions



Europe

# Path Forward

- **Embrace change and be part of the solution**
- **Policy that is performance and outcome based**
- **Don't need to choose. There is proven available cost effective technology recognized globally - Profitable**
- **Impact of less than 1cent/mcf**
- **Creates the Social License to operate and improves air quality – creates jobs and businesses – Diversify our economy**
- **Energy future is about collaboration**

## **COST REDUCTION FOR CLIENTS**



## **PUBLIC CONFIDENCE**



**QUESTOR**  
QUESTOR TECHNOLOGY INC

**ClearPower**  
SYSTEMS Inc.

**QUESTOR SOLUTIONS  
AND TECHNOLOGY INC**

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## **ENVIRONMENTAL PROTECTION**



**[www.questortech.com](http://www.questortech.com)  
[www.clearpowersystems.com](http://www.clearpowersystems.com)**

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