Need for Remote Monitoring Systems

- Compilation of multi-parameter time-series data to:
  - Fully evaluate potential GHG emission reduction opportunities.
  - Allow proper engineering of control measures.
  - Baseline GHG emissions prior to implementation of a control measure.
  - Provide ongoing monitoring of emission reductions achieved and system performance.
Monitoring Panel Features

- Remote Terminal Unit
  - Onsite data processing capabilities.
- Terminal blocks for up to 40 direct-wired sensors.
- Radio transmitter/receiver for communications with sensor clusters.
- Wireless gateway for communications with wireless sensors.
Monitoring Panel

- Cellular Modem
- Satellite Modem
- Data Storage
- Solar or supplied power.
- Hazardous area certification.
Novel Features

- **Cellular communications.**
  - Current practice is to use telephone lines, radio towers or satellite service.
    - Limiting or costly to implement.
  - **First successful use of cellular networks for SCADA applications.**

- **Secure Internet accessibility.**

- **Ultra-high polling frequencies.**
  - Automatically controlled by the RTU to suit to capture upsets or peak events.
Novel Features

- 3-D interface via secure Internet connection.
- Real-time trend analysis of both measured and calculated parameters:
  - Gas Composition: based on measured molecular weight.
  - Losses: CH4, LPG, NGL, H2, and $.
  - Emissions: GHGs, CACs (CO, VOCs, SO\textsubscript{2}, NO\textsubscript{X}, PM)
  - Emission Reductions: GHGs, CACs
Flare Monitoring System
Micro-condenser Monitoring Application
Tank Monitoring System

Carstairs

Tank 7

Vent 1
- Hydrocarbon Concentration
- Temperature
- Oxygen Concentration
- Flow Velocity
- Speed of Sound

Vent 2

Weather Station

Panel

04-03-2013

Vent 2

HC Concentration: 0.02 mol %
Temperature: -10.71 °C
Oxygen Concentration: 19.34 mol %
Flow Velocity: -0.03 m/s
Speed of Sound: 178.1 m/s

Tank 7

Vent 1

Weather Station

Panel
Scada Site - Carstairs

**Carstairs**

- Tank 7
- Vent 1
- Vent 2
  - Hydrocarbon Concentration
  - Temperature
  - Oxygen Concentration
  - Flow Velocity
  - Speed of Sound
  - Weather Station
  - Panel

**Signal Details - Oxygen Concentration**

- Description: SEC 3000 02 Gas Detector - Vent1
- Signal Type: Analog
- Source / Sensor: Vent1
- RTU: RTU-CAR01
- Assigned Operating Range (4mA): 0
- Assigned Operating Range (20mA): 25
- Assigned Units: mol%
- Accuracy: 5%
- Design Operating Range (4mA): 0
- Design Operating Range (20mA): 100
- Design Units: mol %
- Normal Power Draw (W): 2
- Maximum Power Draw (W): 0.05
- Maximum Current Draw (A): Wired
- Connection Type: Wired

**Date: 04-03-2013**

**Time: 08:00:05**
Key Benefits

- Ready deployment using cellular communications.
- Minimal or no process disruption to install:
  - Clamp-on sensors
  - Hot tap techniques.
- Rigorous process and source monitoring.
- Real-time monitoring of critical project outputs.
- Verifiable GHG emission reductions.
Thank you!