Remote Real-Time Continuous Monitoring for Methane Emissions
Methane Emission Issue

Methane emissions is one of the biggest issues facing the shale gas industry today. The Environmental Protection Agency (EPA) will announce regulations this summer for the “Climate Action Plan – Strategy to Reduce Methane Emissions” by the White House Administration.

- Goal to reduce methane emissions from the oil and gas sector by 45% from 2012 levels by 2025.
- Plan calls for “Improving Methane Measurement” including developing new measurement technologies and lower-cost emissions sensing equipment.
- Better data collection and measurement will improve understanding of methane sources and trends.

Methane stray gas also presents issues for the industry. Pa DEP Code Title 25 §78.89 "Gas migration response" sets methane monitoring guidelines within 2,500 feet radius from a gas well.
Manual Methane Monitoring

Manual monitoring has been the primary method for detecting methane leaks and monitoring gas migration cases. It is difficult to capture the expected fluctuation in methane concentration with this method. **Problems include:**

- Limited sample data collected and slow response to fix issues.
- Can be costly in terms of man-hours for site monitoring and data reporting.
- Current methods do not record atmospheric conditions which can lead to inaccurate data interpretations.
Real-Time Methane Monitoring

Continuous monitoring is vital for accurate quantification and overall understanding of methane emissions. System integrators often design systems using off-the-shelf components which are typically not battery efficient and require either AC power or a large battery/solar solution for remote monitoring. This increases system cost and maintenance. **Integrated components include:**

- Industrial sensors not designed for low power operation and require 3-5 minute start up
- Sensors integrated to industrial Remote Terminal Units (RTU) or Data Logging Unit
- Cellular router/gateway for wireless data telemetry needing continuous power

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RemoteMonitor™ CH4

The RemoteMonitor™ CH4 is a cost effective solution for real-time continuous methane gas monitoring. Specifically designed for deployments in remote areas without power or wired Internet over long periods. End-to-end solution includes:

- Cloud Based Dashboard
- Data Review & Analytics
- M2M Connect Cloud
- Custom designed data logger with wireless connectivity
- M2M Connect Technology
- Solar Charging
- Cellular, WiFi, or Satellite Telemetry
- Custom designed methane sensor - supports up to (4) sensors

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Collaborated with CSE Corporation to design a custom methane sensor. CSE Corporation has been designing gas detection sensors since the 1970’s.

Sensor was specifically designed for battery powered remote methane monitoring. **Features include:**

- Low power & fast start-up (~15 sec)
- 0 – 100% LEL (5% Volume) Methane Detection
- 0.01% (100 PPM) Resolution
- Optional Integrated Air Pump
- Single Button Field Calibration
- Integrated Barometric Pressure & Temperature Sensor

Collecting atmospheric data allows accurate analytical emissions interpretations and data trending.
Real-Time Data Delivery System

M2M Connect Technology is a proprietary modular hardware platform for long-term remote wireless monitoring. Provides a plug-n-play solution for cost-effective continuous sensor monitoring. Turns on modules as needed to conserve battery power.

Features Include:

- Wireless Modem
- GPS
- LCD Display
- 5-Button Menu
- USB Flash Drive Data Storage to 32Gb
- Sensor Interface Port
- Optional Camera
- Solar Panel Charge Controller
- Tamper Detection Sensor
Remote Device Management

The M2M Connect Cloud is a custom designed web-based portal for remote device configuration and sensor data management. RemoteMonitor™ devices can be configured using a standard web browser on PC’s, Smart Phones, and Tablets. Device configuration features include:

- Real-Time alarm event notifications: Sensor Values, Low Battery, and Tamper Detection
- Receive events via E-Mail & SMS
- Remote device set up & Management – Sample Frequency, Alarms Configuration, and Raw Data Downloads (.CSV File)
- View Battery & Signal Levels
- Manage Devices on integrated Google Maps
Continuous monitoring for methane emissions is necessary to establish a realistic baseline. Manual sampling raises significant uncertainties in estimates of current and projected methane emissions. Continuous monitoring offers better measurement understanding of methane sources and trends, and enable more effective management of opportunities to address methane emissions.

M2M Connect Cloud portal integrates real-time data trending of field sensor data.
Value Proposition

• Creates real-time response for detecting methane leaks and emissions which can lower maintenance costs and increase profitability.

• Fast response to address possible safety and liability issues.

• Cost-effective solution to comply with pending regulations and reporting.

• Decrease labor costs and increase data accuracy over manual sampling methods.
Business Information

- Mature Wireless Technology – Released for Product Sales in 2009
- Customers include over 50 Oil & Gas Customers including Exxon Mobil Pipeline, Sunoco, Energy Corporation of America
- System Sales & Leasing Programs, Maintenance Contracts
- Recurring Revenue Business Model – Cellular Data & Cloud Portal
- Verizon VPP Partner – Government/Energy Sales Partner
- Received DCED SGICC Grant 2015
- Received Grant from Innovation Works in 2012 for developing current technology
Future Developments

Camera integration with RemoteMonitor™ CH4 enables photos on demand and/or with alarm events. Integration of Optical or FLIR camera technology.

RemoteMonitor™ Weather Station
Monitor remote site weather conditions such as wind speed & direction, atmospheric pressure, humidity, and temperature with integrated camera.

RemoteMonitor™ TDS
Continuous real-time water quality monitoring of Total Dissolved Solids & Conductivity in watershed areas.