



Methane to Markets

**Natural Gas STAR Experience with
Technological Advances in Methane
Emission Detection and Measurement**

*Don Robinson, ICF International
On behalf of Methane to Markets and EPA Natural Gas STAR International
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Methane to Markets Country to Country Partnership

- International initiative that advances cost-effective, near-term methane recovery and use as a clean energy source

North America

Canada
Mexico
United States

South America

Argentina
Brazil
Chile
Colombia
Ecuador

Africa

Nigeria

Europe & FSU

European Commission
Finland
Germany
Italy
Kazakhstan
Poland
Russia
Ukraine
United Kingdom

Asia Pacific

Australia
China
India
Japan
Korea
Mongolia
Pakistan
Philippines
Thailand
Vietnam

28 Partner governments account for 60% of anthropogenic methane emissions

Natural Gas STAR International

- Under the Methane to Markets Partnership, U.S. EPA expanded Natural Gas STAR internationally (NGSI)



Oil and Gas Subcommittee



- NGSI is the vehicle to implement company goals
 - Technology transfer: studies and workshops
 - Emissions mitigation options and economics
 - Emissions verification detection/measurement studies

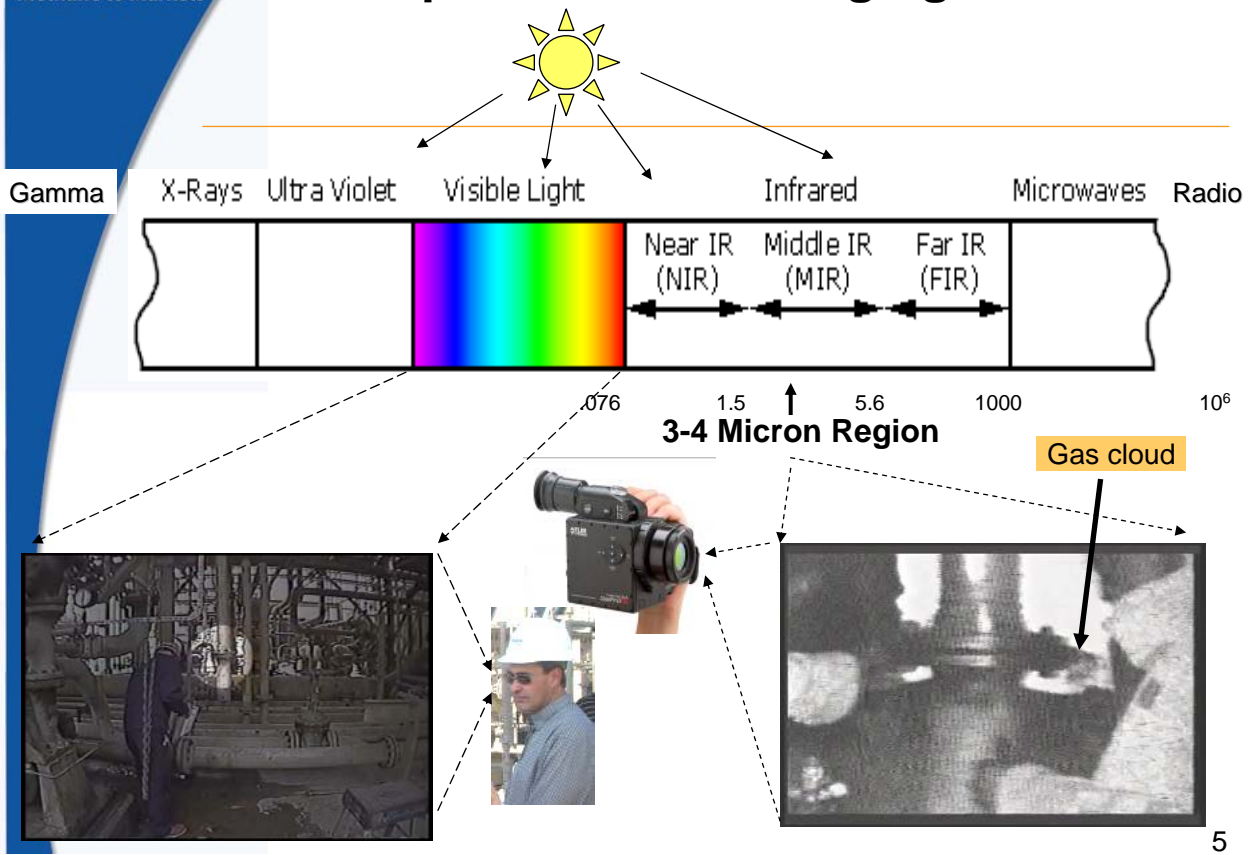
Natural Gas STAR International Technologies & Practices

- 15 years of experience working with oil and natural gas companies to identify opportunities to reduce methane emissions
- NGSi provides over 80 technical documents on CH₄ mitigation technologies and practices (English and Spanish)
 - epa.gov/gasstar/tools/recommended.html
- 50+ apply to production sector activities
 - Dehydrators
 - Compressors
 - Tanks
 - Well venting practices
 - Flaring practices
 - Pneumatic instruments



– **Leak detection with remote infrared (IR) imaging**

Principle of IR Leak Imaging Camera



Tools Available for Remote Sensing

- Aerial Leak Inspection
 - IR camera mounted to aircraft
 - Fly-over inspection of gathering networks



Source: Lasen

Source: Targa Resources



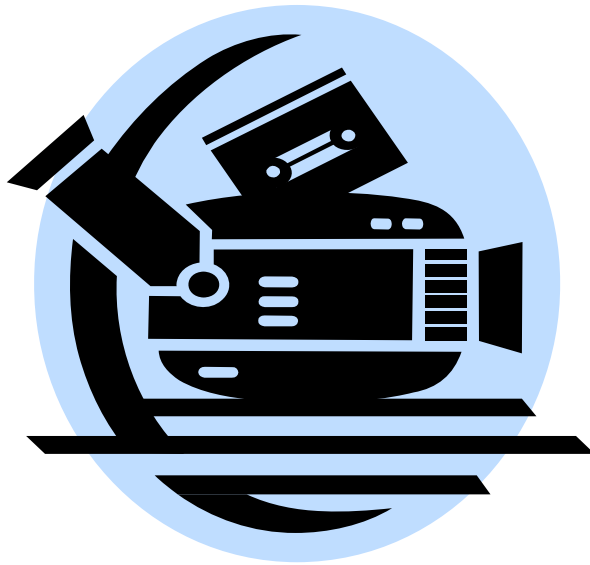
- Handheld IR camera
 - Carried around site to inspect individual equipment components
 - Displays & records images of leaks

- Remote Methane Leak Detector
 - “Point and shoot” technique
 - Methane absorbs IR laser, notifies user



Source: Heath Consultants

Video Clips of IR Emissions Imaging



Summary of Leak Detection Options

Leak Detection Option	Cost Elements	Approximate Cost Ranges
Remote Methane Leak Detector	<ul style="list-style-type: none"> ▪ The device itself 	\$10,000 - \$20,000
Handheld Camera	<ul style="list-style-type: none"> ▪ The device itself ▪ Batteries ▪ Additional desired lenses 	\$70,000 - \$130,000
Aerial Inspection	<ul style="list-style-type: none"> ▪ Camera ▪ Gyrostabilizer mount ▪ Helicopter rental ▪ Pilot per hour ▪ Fuel per mile 	\$65/mile service \$500/hr aircraft \$2-3000 mount

Tools Available for Emissions Quantification

- Once leaks are identified, quantify them
- Meters
 - Typically better than $\pm 5\%$
 - Application limited by leak orifice shape
- Calibrated Bags
 - Application limited to safely accessible leaks
- High Volume Sampler
 - Typically $\pm 10\%$
 - Measures methane composition and leak rate
 - Any leak up to 10 cf/minute
 - Measures 30 components/hour



Source: Heath Consultants

Partner Case Study Targa Resources

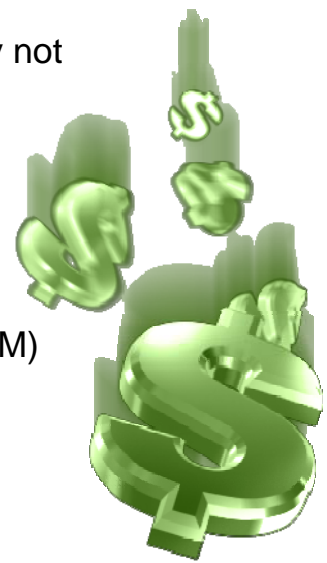
- Surveyed components in two processing plants: 23,169 components
- Identified leaking components: 857 about 3.6%
- Top 10 leaks >50% of total emissions
- Repaired 80 to 90% of the leaking components
- Annual methane emissions reductions: 198,000 Mcf/year
- Annual savings: \$396,000/year (at \$2/Mcf)



Source: Targa Resources

A Note on Project Economics

- At \$3/Mcf, 77% of the 80 recommended technologies and practices pay back within 3 years and 47% pay back within 1 year
- Economics based on gas value alone may not always drive projects
- Gas value can be augmented if
 - Gas used to replace more expensive fuel (eg. for electricity generation)
 - Natural gas liquids value included
 - Carbon credit is leveraged
- Four Clean Development Mechanism (CDM) methodologies approved or under review



Beyond Project Economics

- Companies have reported many reasons for reducing methane emissions
 - Safety concerns
 - Utilization of local energy source
 - Operational and efficiency improvements such as reduced maintenance and fuel costs
 - Reduced loss of a valuable domestic non-renewable fuel
 - Corporate mandate to operate in environmentally responsible manner
 - Internal greenhouse gas emission reduction goals
 - Addressing shareholder concerns about mitigating future climate risk



Beyond Monetary Incentives

- What happens when a transmission company does not directly benefit from the methane reductions?
- Due to GPL's tariff, there is no monetary incentive for the reduction of methane emissions.
- ONEOK Partner's Strategic Plan states that we will provide reliable energy-related services in a safe and *environmentally responsible* manner.
- Environmental Stewardship

Contact Information

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