

# ARPA-E Ubiquitous Methane Sensing Workshop

## Agenda and Goals for the Day

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ARPA-E

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# Thank You!

**ARPA-E's work would not be possible without people like you volunteering their time**

# Apologies!

**For the tight environment. We have had overwhelming response for this workshop.**

**You are witnessing the final weeks of the original ARPA-E office (formerly the Yucca Mountain Project office)**

# Why are we here?

## 1. Safety



Pipeline explosion, San Bruno, California 2010

# Why are we here?

## 2.Economics

***In addition to the costs of accidents, there is \$10s – 100s millions in methane lost to companies and customers***

# Why are we here?

## 3. Environment

	Global Warming Potential		
<u>Gas</u>	<u>25 Years</u>	<u>100 Years</u>	<u>500 Years</u>
CO <sub>2</sub>	1	1	1
CH <sub>4</sub>	56	21	6.5

Natural gas has about 50% CO<sub>2</sub> emissions of coal.

25 year scale: ~1% leakage rate removes GHG benefit

50 year scale: ~2.5% leakage rate removes GHG benefit

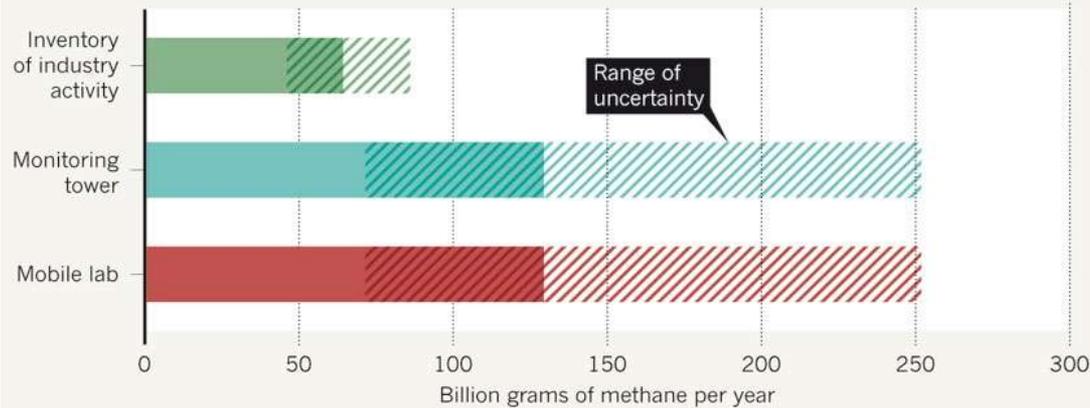


# Report in Nature 2/12: Natural Gas Producers in Denver Area losing ~4% of their Methane.



## A LOSING BATTLE

Estimates of methane losses from gas fields near Denver, Colorado, based on air sampling differ considerably from calculations based on industry activity.



***“the debate has been marked by a scarcity of hard data.”***



# What is our goal?

Answer: To justify a possible research program.

We do this in a two step process:

1. If it works, would it matter?
2. Is there anything that could possibly work?

# 1. If it works, would it matter?

This is the question we are addressing in the morning sessions

Trying to get to a Techno Economic Goal

Such as the **BEEST Targets:**

**400 Wh/kg**

**\$300/kWh**

## **2. Is there anything that could possibly work?**

This is the question we are addressing in the afternoon sessions

**When looking at the technologies we ask:**

- **Can they reach the techno-economic target?**
- **Are they unlikely to do it without ARPA-E funding?**

# Breakout Sessions



**Dr. Karma Sawyer**  
Assistant Program Director



**Colin McCormick**  
Senior Advisor for R&D  
*U.S. Department of Energy*



**Dr. Robert Conrado**  
ARPA-E Fellow



**Dr. Dane Boysen**  
Program Director

Techno Economic Goals

Techno Economic Goals

Improved Sensors

Sensor Platforms and Strategy

# A thank you to our morning speakers



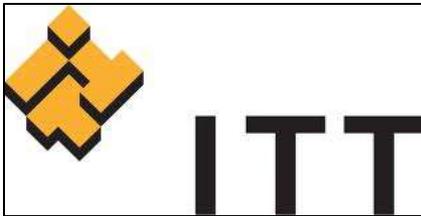
**Roger Fernandez**

EPA Natural Gas Star Program



**Jack Lewnard**

Gas Technology Institute



**Daniel Brake**

ITT Exelis



**Mark Zondlo**

Princeton University

# A thank you to our afternoon speakers



**C. Kumar Patel**  
Pranalytica/UCLA



**Gerard Wysocki**  
Princeton University



**Gary Viviani**  
Insitu Inc.



**Mickey Frish**  
Physical Sciences Inc.



**Vijay Kumar**  
University of Pennsylvania

# **A Plea to Our Speakers: Please Watch the Time!**



**We have a lot to get through.  
There will be plenty of time to  
elaborate in breakouts**

**This is VCS. ARPA-E staff will lead you to Rockstar**

**If you are not assigned to a breakout session see me at the break at 9:30**

**We have a great group here:  
Chance to network during  
break, lunch and at  
L'Enfant Plaza Hotel  
Bar at 3:30 PM**

