

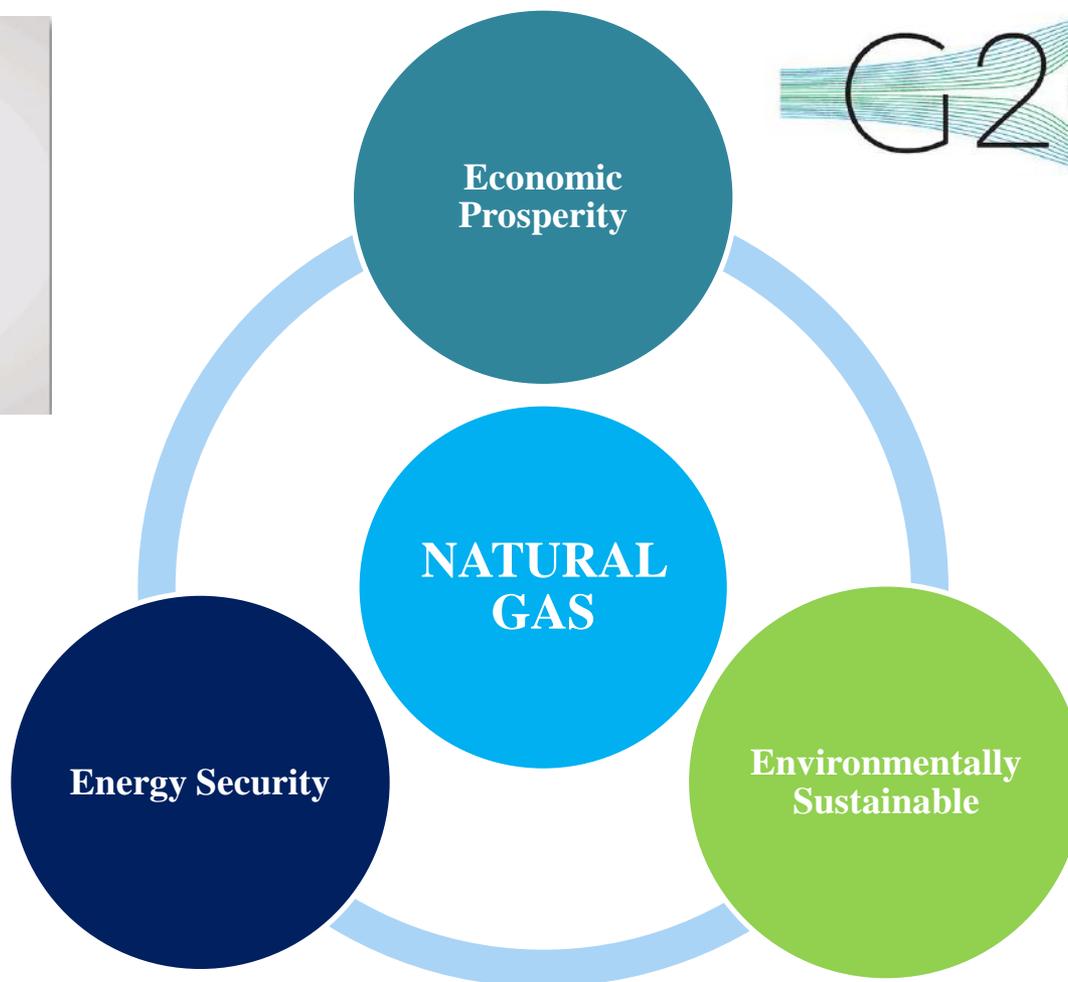
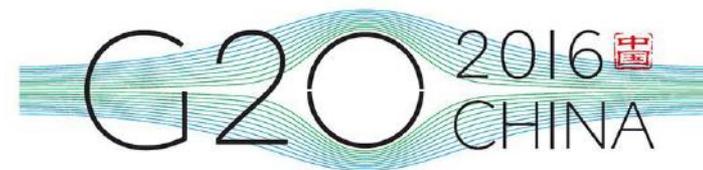


# **An Operator's view on Methane Detection and Abatement**

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# Role of Natural Gas

## Prudent Development and Use



Source: NPC (2011)

## 1. Emission Studies

- Measurements at the source (“bottoms-up”) indicate emissions are close to estimates.
- Measurements using aircraft (“top-down”) indicate emissions higher than estimates.
- A “reconciliation” paper authored by NOAA-CSU and sponsored primarily by the US DOE will provide significant new insights

## 2. Regional Variations

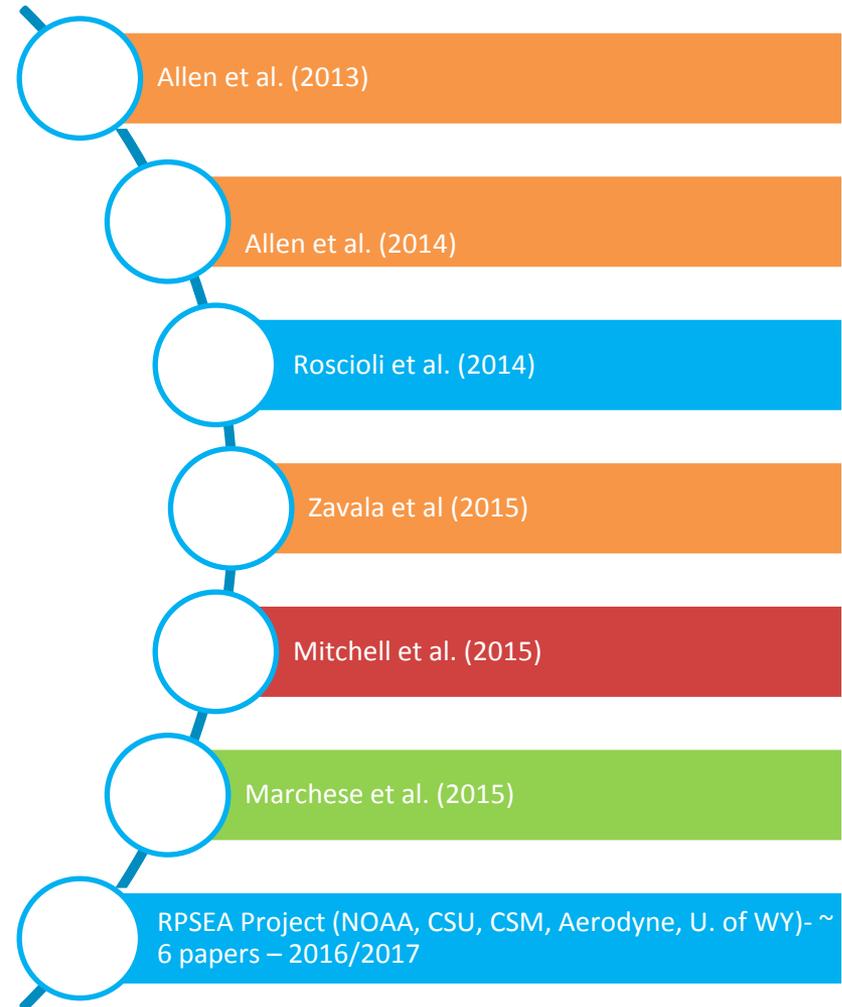
- There are significant regional variations among emission sources.
- Differences likely attributable to
- (i) type of natural gas production (i.e. wet gas-vs-dry gas) and (ii) the age, number and type of infrastructure.

## 3. Exceptional Minority

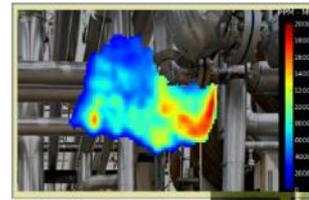
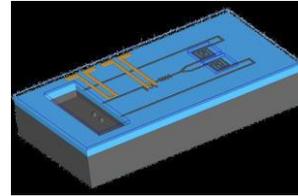
- A relatively small number of sources are responsible for a disproportionately large volume of emissions.
- Sources - Chronic / Episodic / Malfunction

## 4. Cost-Effective Reduction Opportunities

- Cost-effective emission control technologies can be employed today.
- Advancements in emissions detection and measurement technologies are needed.



# Methane Monitoring – Developing Technologies



Google Glass view



Control room view

Smartphone view



## Technologies

- Laser absorption spectroscopy
- LiDAR (Light Imaging Detection and Radar)
- Infrared camera
- On-chip optical sensor
- Frequency comb-based sensing
- Carbon nanotube sensor
- Miniature mass spectrometer
- Optical fiber sensor
- Mid-infrared laser

$$\frac{R^2}{A} \rightarrow V^+$$

- LDAR Program Instruments

- Optical Gas Imaging Cameras
- Heath Remote Methane Leak Detector
- Bacharach Hi-Flow (flow rate)



- LDAR Survey Frequency

- New wells within 60 days
- Annual survey
- Resurvey repair within 15-days

- LDAR Survey

- Components (valves, connectors, relief valves, open ended lines)
- Equipment (pneumatic controllers, pneumatic pumps, compressor seals, storage tank hatches, etc)

- The purpose of the SMART LDAR Program is to “find and fix” methane leaks



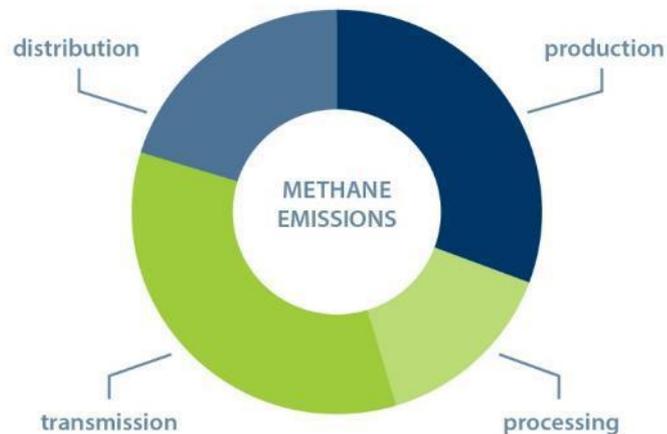
- Align monitoring with operational and maintenance practices
  - Use of SCADA
  - Daily / weekly checks by operators
  - Standard operating practices / training for operators
- ➔ *Malfunctions (potentially large sources of emissions) can be quickly identified and repaired by trained operators.*
- LDAR or parametric systems (models) provide:
  - low cost detection and potentially a “reasonable” estimate of emissions from the facility
  - Predictive assessment for maintenance, repairs and resource (capital and \$) deployment
  - Advanced systems should cost less than “traditional” LDAR
  - Hybrid approach: low-cost, fast surveys to detect “higher emitters” (i.e. > X scfh)
- Need opportunity to use “direct measurements” in lieu of regulatory default factors
  - Establish standardized protocols for measurements
  - Streamlined mechanism for approval of the test results

# ONE<sup>®</sup>

OUR NATION'S ENERGY  
FUTURE

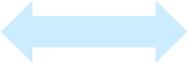
## OUR VISION

Enhance the energy delivery efficiency of the natural gas supply chain by limiting energy waste and by achieving a methane "leak/loss rate" of no more than one percent.

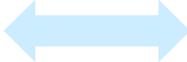


# Methane Policies & Programs



Set an **ambitious target.**  Allow **flexibility.**

Focus on **cost-effectiveness.**  Get **results fast.**

Foster **innovation.**  Insist on **scientific integrity.**

Thank you!

Questions?