

New Tools for Distribution Leak Survey

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Consumers Energy

Count on Us

About



One of the nation's largest combination utilities, providing electric and natural gas service to nearly 6.6 million of Michigan's 10 million residents, in all 68 Lower Peninsula counties.



Strategic Innovation works with internal and external partners to identify and validate technologies and processes that strategically align with Consumers Energy's strategic goals.

PICARRO

Picarro delivers real-time, cloud-based solutions that enable science and industry to measure greenhouse gas emissions in our air, water and soil. The Smart Gas Detection technology of Picarro Surveyor is a proven solution for surveying mains and services at driving speeds, identifying likely leak locations, as well as leak-free areas.

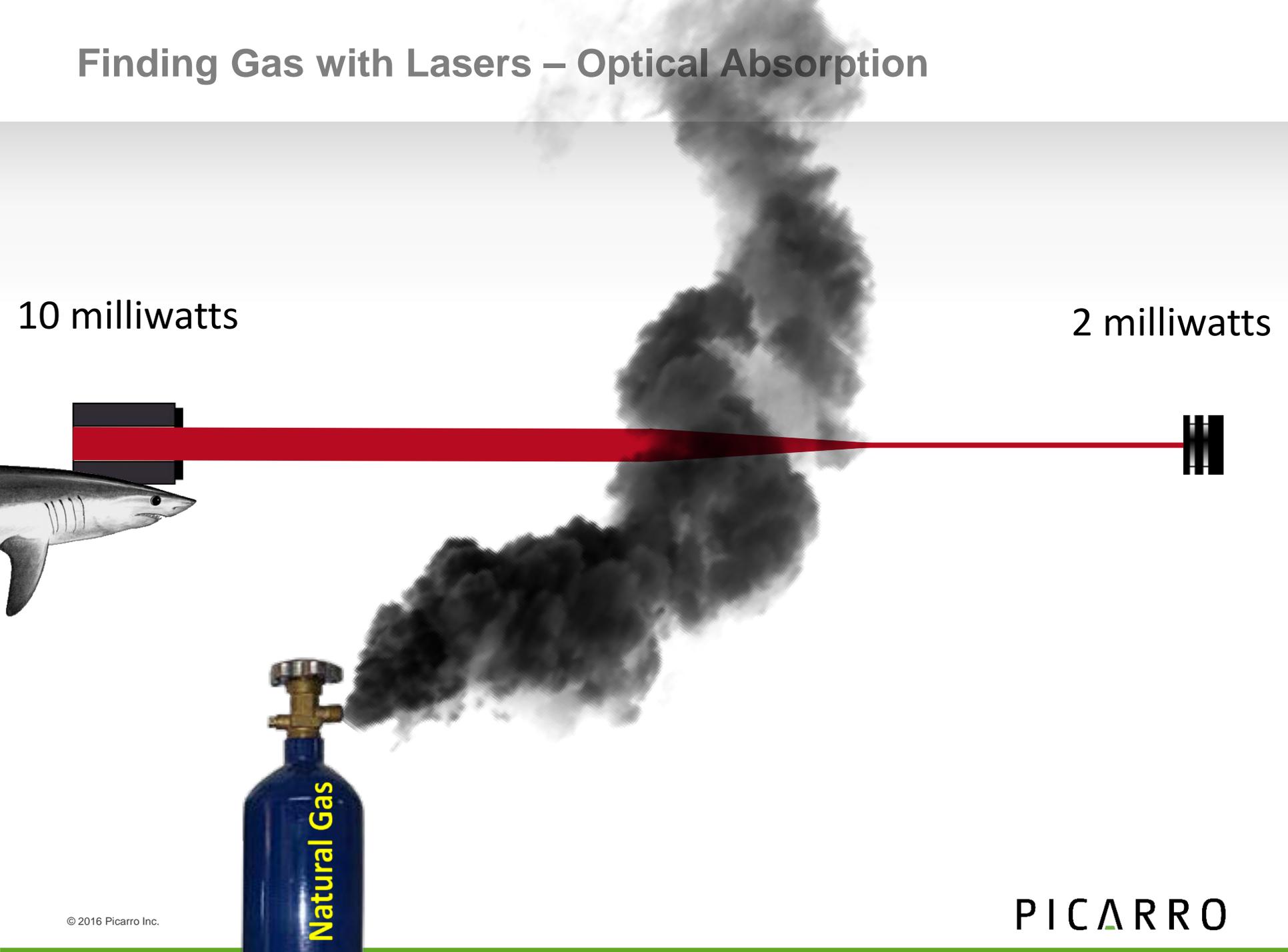
Finding Gas with Lasers – Optical Absorption

10 milliwatts

10 milliwatts



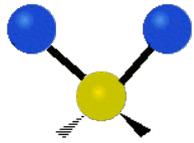
Finding Gas with Lasers – Optical Absorption



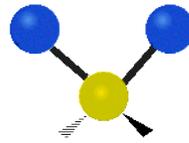
10 milliwatts

2 milliwatts

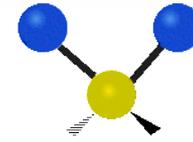
Optical Absorption



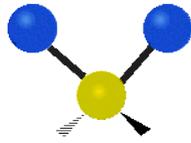
Symmetrical stretching



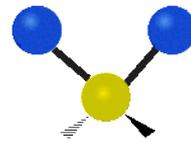
Antisymmetrical stretching



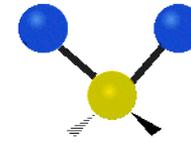
Scissoring



Rocking

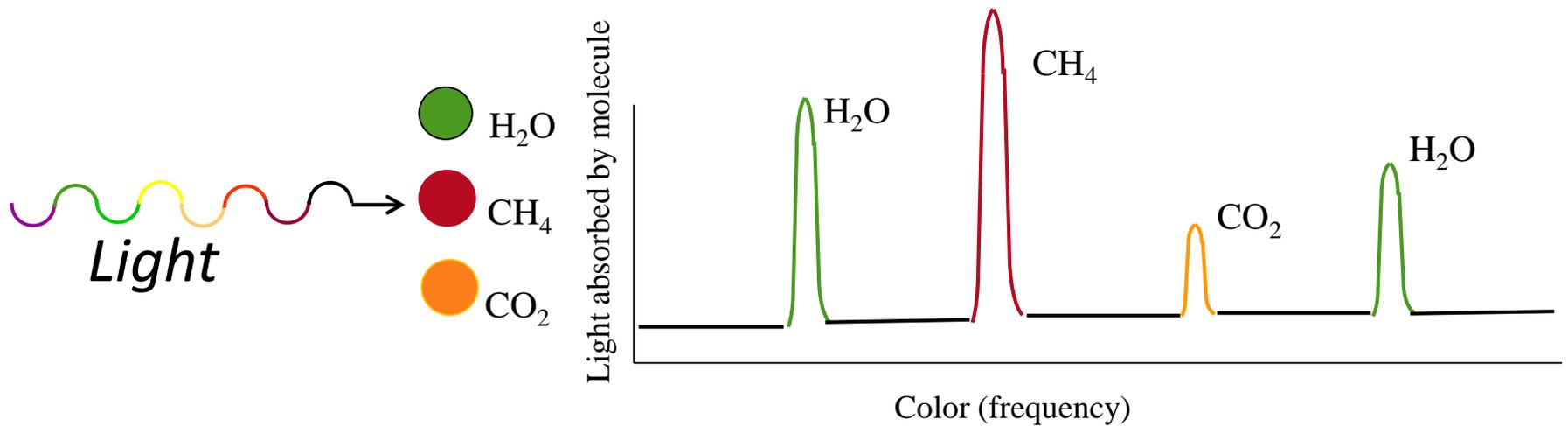


Wagging

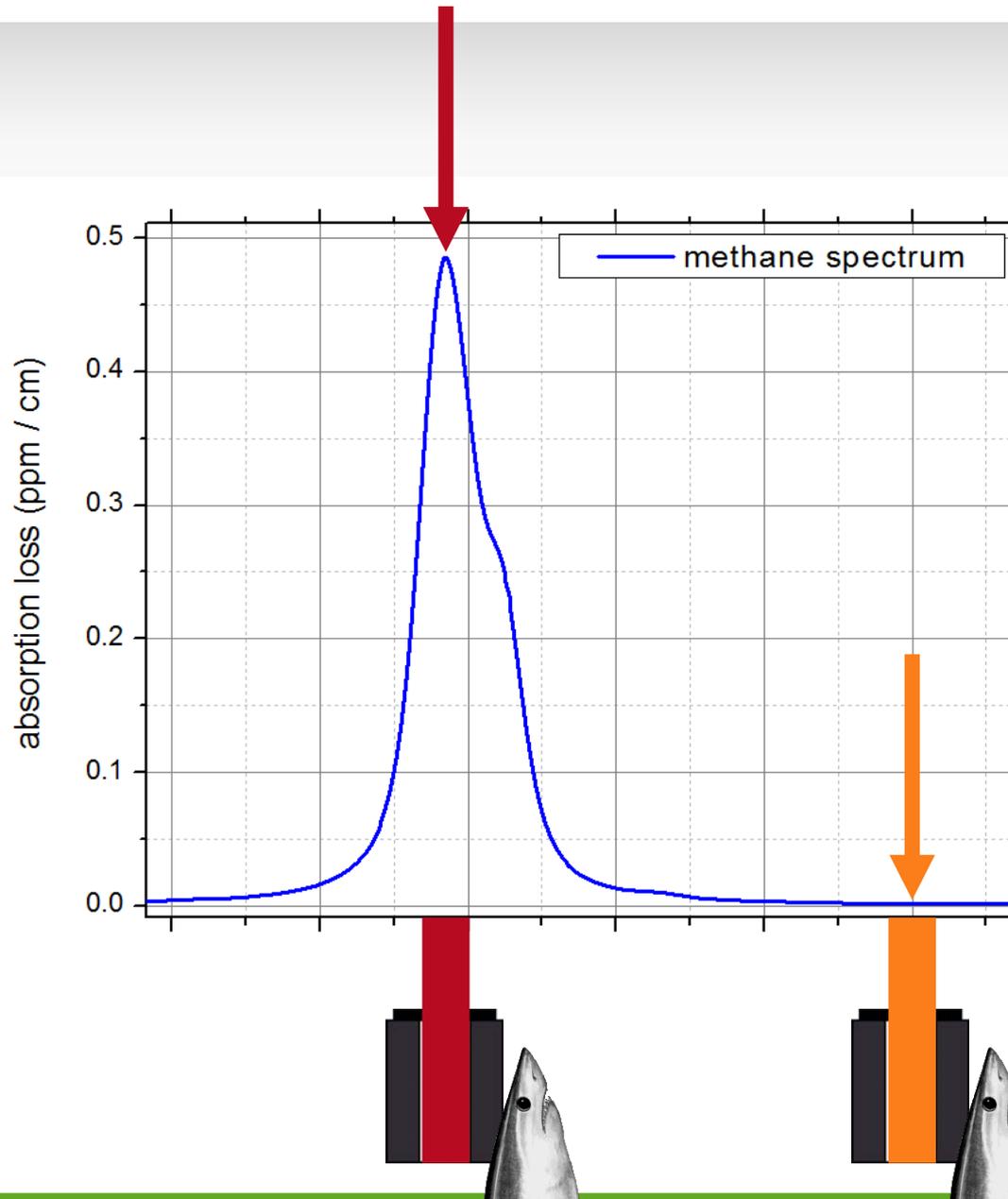


Twisting

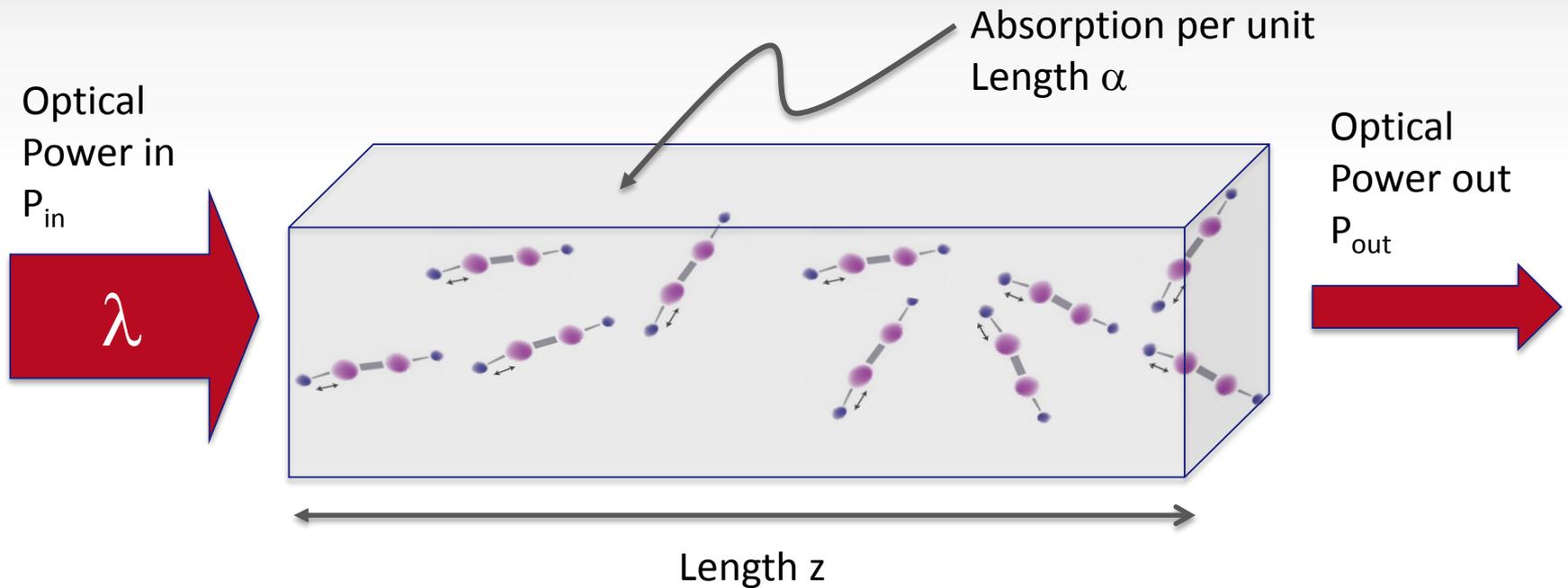
Resonant Optical Absorption



Resonant Optical Absorption

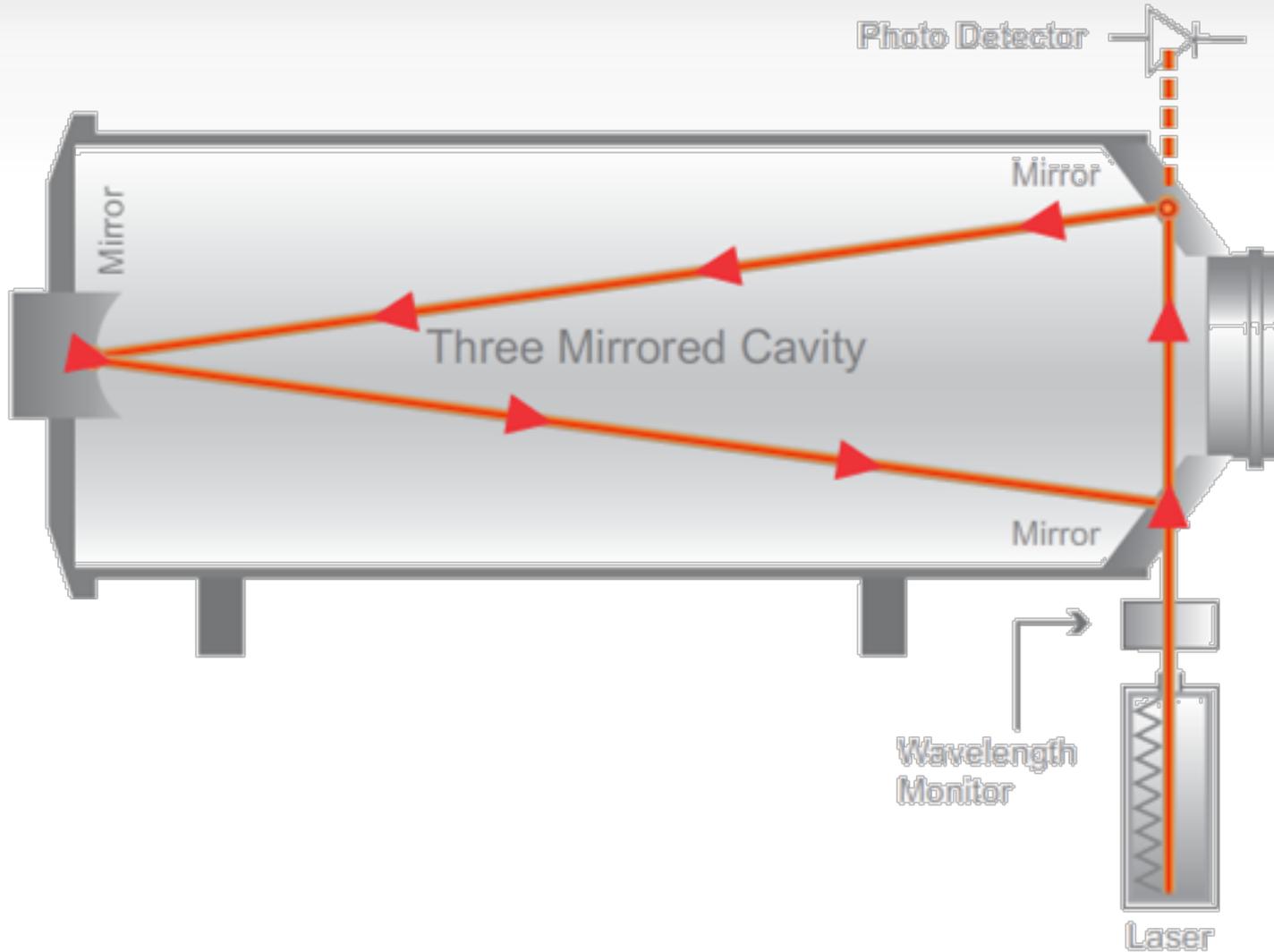


Beer - Lambert Law for Optical Absorption

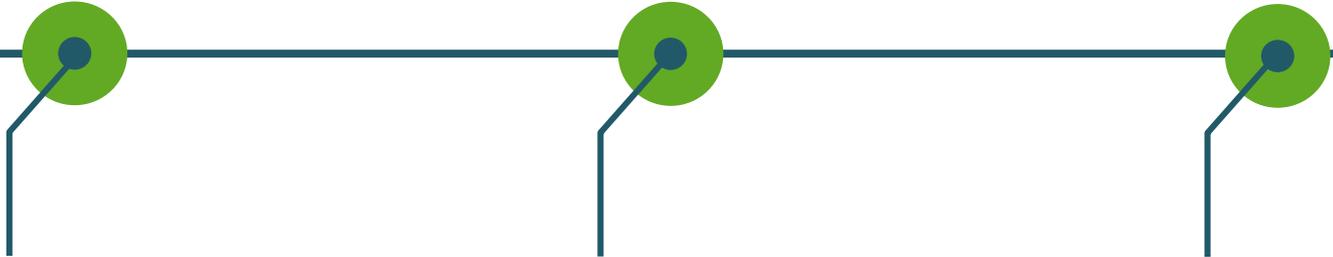


$$Power_{out} = Power_{in} e^{-(\alpha_{molecule} + \alpha_{everything\ else})z}$$

Lasers In a Cavity



Sensors



A horizontal dark blue line spans the width of the slide. Three green circles are positioned above the line. Each circle has a dark blue dot in its center. A dark blue line connects each dot to a label below the line. The labels are 'Odorization', 'ppm', and 'ppb' from left to right.

Odorization

ppm

ppb

Computers



Mainframe

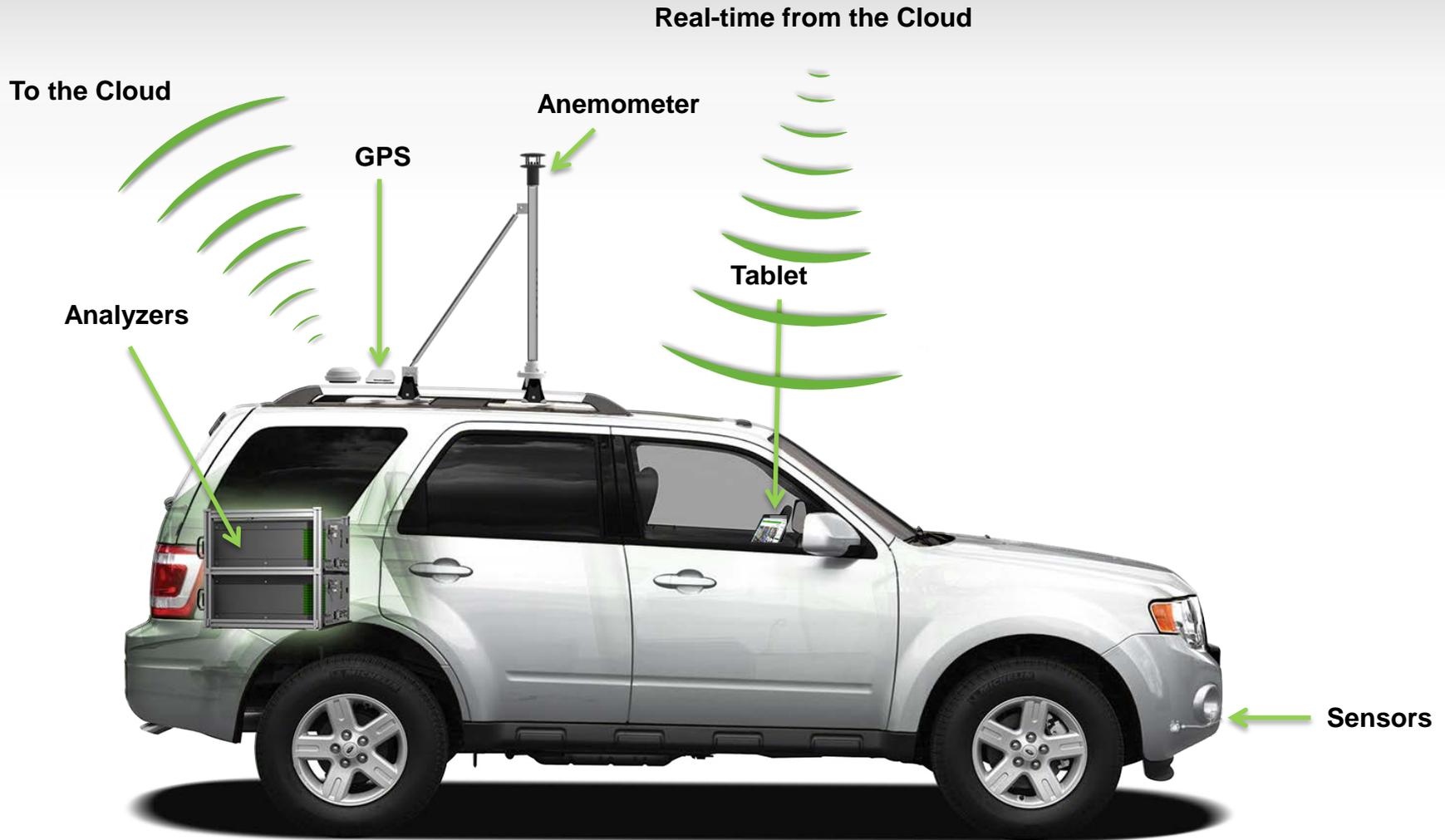


Client/Server



Connected

Example Advanced Leak Detection Technology



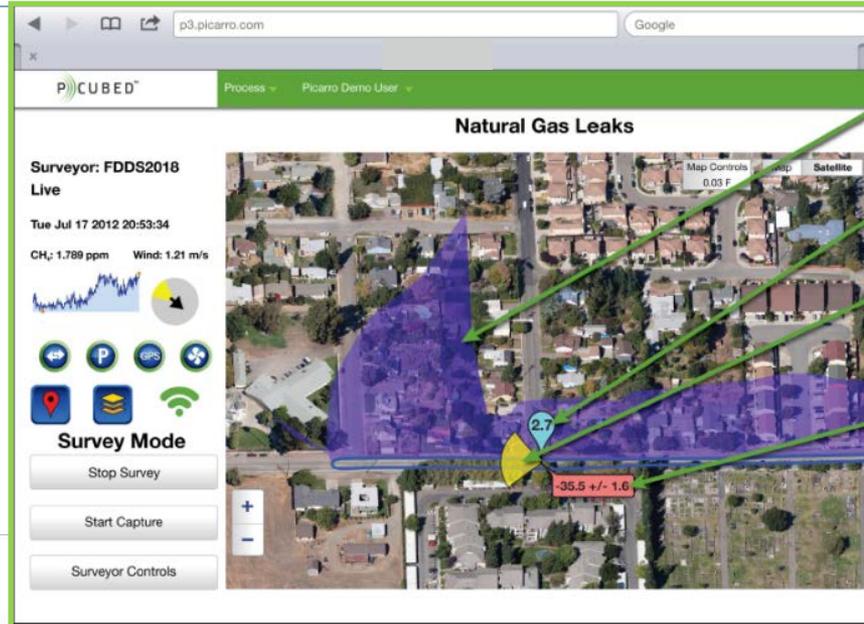
Technology Overview

DOES

- Detect Methane
- Operate at Normal Speeds
- Provide Real-Time Analytics
- Reduce Investigation Zone
- Reduce Walking Surveys
- Differentiate Methane Sources

DOES NOT

- Verify Leaks
- Grade Leaks



Field of View

Peak Bubbles

Leak Indication Search Area (LISA) (Wind Markers)

Isotopic Analysis Results

Traditional leak survey technology is limited to ~10' radius

Picarro leak survey technology senses up to 600' from source

Data collection that more efficiently allocates resources

CMS Strategic Innovation - Pilot



Late Nov/Early Dec 2015

Pipeline Material

- Protected Steel
- Plastic



Phase 1: Lansing

CMS Strategic Innovation - Pilot

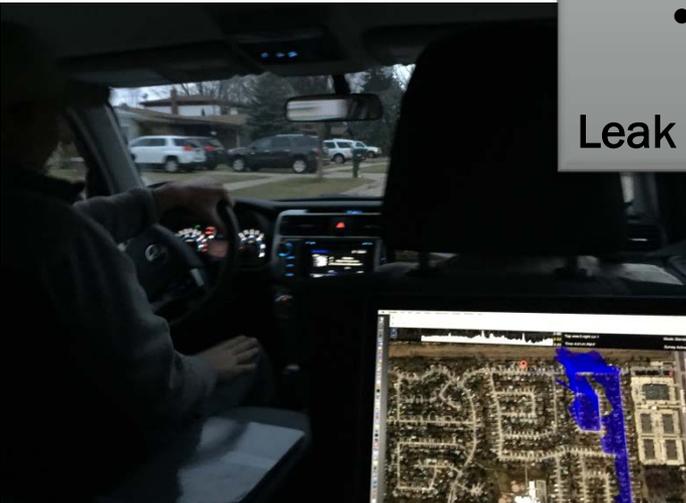
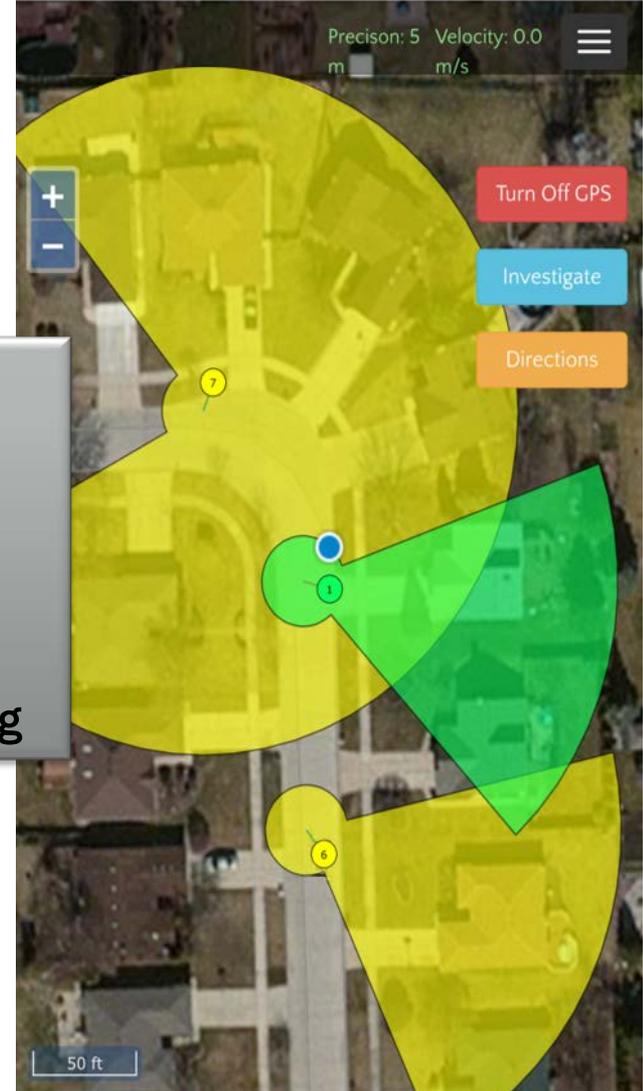


Spring 2016

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Leak Investigations and Grading



Phase 2: Flint & Detroit (Suburbs)