U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

Methane Mitigation Technologies Program Overview

CH_4 Connections 2022

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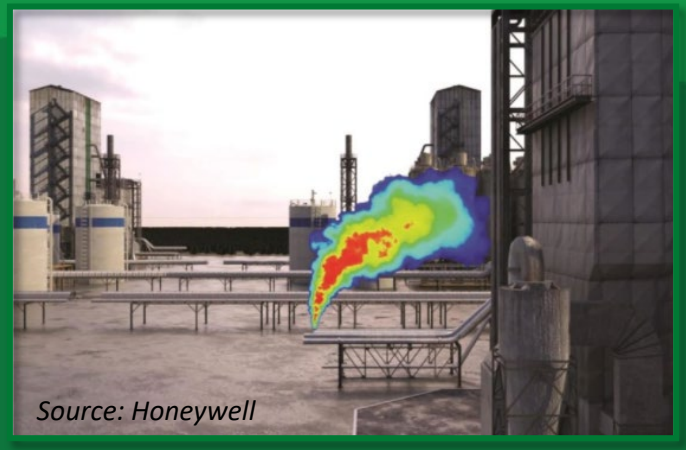
October 20, 2022

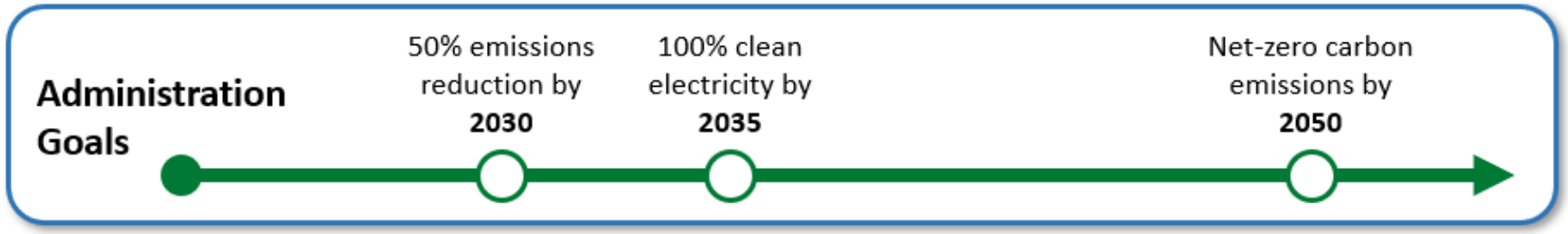

Source: Honeywell


Source: NETL


Source: Konica Minolta

Program Mission

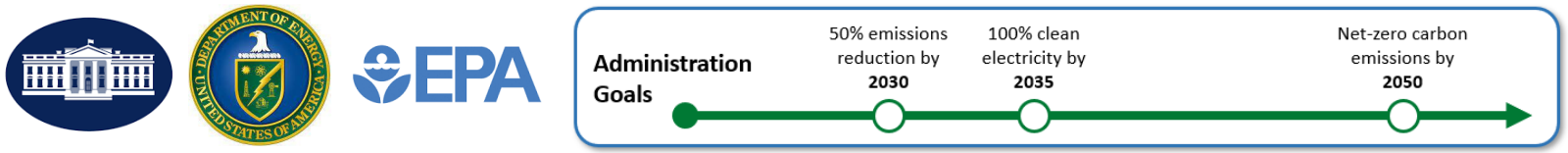
Administration's Goals



Accelerate the development and deployment of ***technology solutions*** to increase the efficiency, reliability, resiliency, and ***elimination of methane emissions*** across the oil and natural gas infrastructure—from oil and natural gas production, through processing, transportation, and storage, to end-use utilization.

Dynamic Factors Shape R&D Portfolio

Administration's Goals



Shifting Priorities of Industry Research Partners

International Considerations

Rapidly Changing Technology

National Laboratory and Academic Research Partners Capabilities

Argonne NATIONAL LABORATORY
BROOKHAVEN NATIONAL LABORATORY
INL Idaho National Laboratory
Los Alamos NATIONAL LABORATORY
Lawrence Livermore National Laboratory
Lawrence Berkeley National Laboratory
NETL
NREL
OAK RIDGE National Laboratory
Pacific Northwest NATIONAL LABORATORY
SLAC NATIONAL ACCELERATOR LABORATORY
Sandia National Laboratories
SRNL

Methane Mitigation Technologies Division

Methane Emissions Mitigation

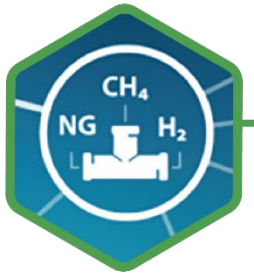
Advanced materials, data management tools, inspection and repair technologies, and dynamic compressor R&D for eliminating fugitive methane emissions across the natural gas value chain

Methane Emissions Quantification

Direct and remote measurement sensor technologies and collection of data, research, and analytics that quantify methane emissions from point sources along the upstream and midstream portion of the natural gas value chain

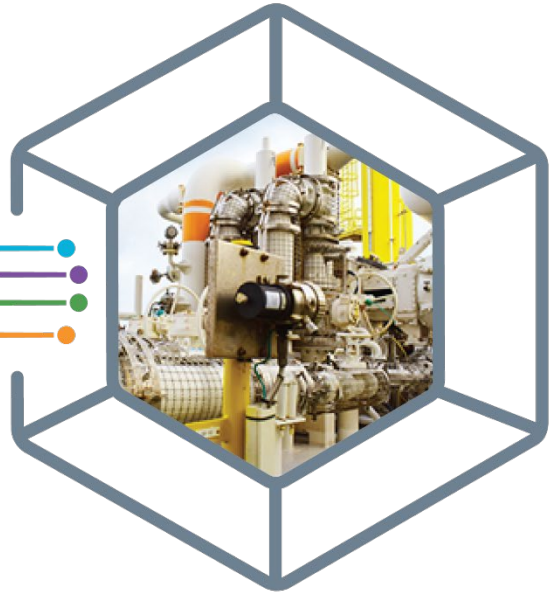
Decarbonization of Natural Gas Resources

Technologies for carbon-neutral hydrogen production, safe and efficient transportation, and geologic storage technologies supported by analytical tools and models



Undocumented Orphaned Wells Research

Developing tools, technologies, and processes to efficiently identify and characterize undocumented orphaned wells in order to prioritize them for plugging and abandonment.



Detection, Measurement, and Monitoring Technologies

Methane Emissions Quantification

Direct and remote measurement sensor technologies and collection of data, research, and analytics that **quantify** and **characterize** methane emissions from point sources along oil and natural gas system

- **Operating Marginal Oil and Natural Gas Wells**
- **Gathering and Compressor Boosting Stations**
- **Orphaned Oil and Natural Gas Wells**
- **Gathering Natural Gas Pipelines in Colorado/Utah/Ohio/New Mexico/Pennsylvania**
- **Metering and Regulating Stations**
- **Underground Natural Gas Storage Incident Emissions**
- **Smart Methane Emissions Detection System (SLED)**
- **Advancing Development of Emissions Detection (ADED)**

Marginal Oil & Gas Wells

More than 1.1 million oil and natural gas wells in the U.S., of which approximately 770,000 (~70%) are considered "marginal" (<15 barrels of oil equivalent (BOE) per day of combined oil and natural gas)

How do marginal vs. non-marginal wells compare in terms of:

- Fugitive methane emission rates?
- Type and quantity of equipment?
- Equipment type/age/condition?
- Hydrocarbon Production rates?
- Frequency/timing of episodic high-emission events?
- Absolute contribution to total emissions?

Three Field Campaigns: 589 total sites sampled (524 "marginal")

- Appalachia: 168
- Midwest and Rocky Mountain: 151
- Western US region: 270

Exampe Result

- The top 10% of emitting sources contributed 90% of total methane emissions observed





Mitigation Technologies

Methane Emissions Mitigation

Advanced sensors, tools, equipment, and technologies to **reduce** or **eliminate** chronic and acute methane emissions from point sources along the oil and natural gas value chain.

- **Improved Compressor Designs and Retrofit Kits**
- **Smart Pipeline Sensors: Fiberoptic, Surface Acoustic Wave, Electrochemical**
- **Advanced Pipeline Repair Coatings**
- **Retrofit/self-healing pneumatic controllers**
- **Associated gas conversion to eliminate flaring**
- **Eliminating compressor engine methane exhaust slip**
- **In-line pipeline inspection and repair**

Advancing Technology

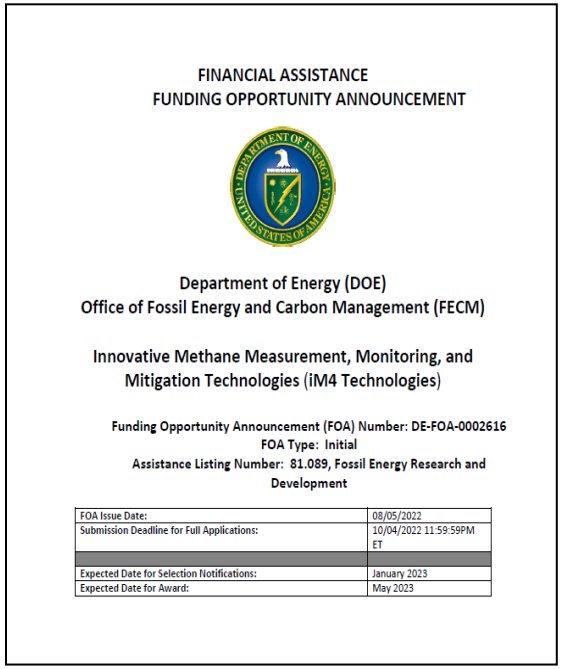
Innovative Methane Measurement, Monitoring and Mitigation Technologies (iM^4 Technologies)

- Advanced Methane Mitigation Technology Solutions
- Surface-based Methane Monitoring and Measurement Network Pilot Demonstration
- Basin Specific Methane Emissions Inventory via Field Assessments
- Integrate Methane Monitoring Platform Design
- Storage Tank Emissions (Field)

Scale: $46 Million

FOA Closing: October 18, 2022

Project Awards: February 2023



FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

Department of Energy (DOE)
Office of Fossil Energy and Carbon Management (FECM)

Innovative Methane Measurement, Monitoring, and Mitigation Technologies (iM4 Technologies)

Funding Opportunity Announcement (FOA) Number: DE-FOA-0002616
FOA Type: Initial
Assistance Listing Number: 81.089, Fossil Energy Research and Development

FOA Issue Date:	08/05/2022
Submission Deadline for Full Applications:	10/04/2022 11:59:59PM ET
Expected Date for Selection Notifications:	January 2023
Expected Date for Award:	May 2023

DE-FOA 0002616

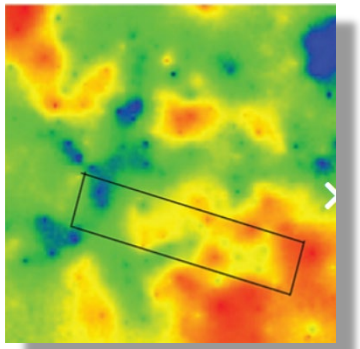
Looking Ahead

Eliminating Natural Gas Flaring

"Putting out the Fire"

Offshore

Abandoned Coal Mines



Thank you

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