NGIF ACCELERATOR

INDUSTRY GRANTS PROGRAM

METHANE REDUCTION DEMONSTRATION PROGRAM

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1. Introduction

The oil and gas industry, spanning upstream (exploration and production), midstream (transportation and distribution), and downstream (commercial and residential consumers), is essential to supply global energy needs; the industry requires innovative technology solutions to provide lower-emissions energy to support national and international greenhouse gas reduction ambitions. Methane, a potent greenhouse gas, can be released at different parts of the natural gas value chain. Effective management of methane emissions is critical for the industry's environmental sustainability and regulatory compliance requirements. The Methane Reduction Demonstration Program seeks innovative solutions for the following:

A. Methane Mitigation and Reduction
B. Methane Measurement and Quantification

specifically designed for the unique needs of the natural gas value chain.

2. Challenge Statement

The oil and gas industry is seeking transformative technologies to detect, quantify, and reduce methane emissions across upstream, midstream, and downstream operations. This includes advanced methods for real-time monitoring and data analysis, deployment of state-of-the-art hardware for methane detection and quantification, and innovative solutions for mitigating methane emissions from various sources.

The goal is to develop scalable, economically viable technologies that seamlessly integrate into the industry, reducing its methane footprint and enhancing sustainability across all sectors.

The following are guided measures for submitting innovative solutions/technologies to the Methane Reduction Demonstration Program. Measures include:

1. **Problem-Solution Fit:** Technologies must solve painful problems in the upstream oil and gas and natural gas transmissions and distribution & end-use value chain.
2. **Performance and Cost Efficiency:** Technologies should be able to demonstrate comparable performance metrics and cost structure to incumbent technologies.
3. **Integration with Existing Operations:** Technologies should have minimal impact on existing operations or offer beneficial integration opportunities. Technologies at all stages of technical maturity are of interest.
4. **Methane Detection Accuracy:** Technologies should achieve high accuracy in detecting and quantifying methane emissions, with minimal false positives/negatives compared to incumbents.

3. Areas of Interest

3.1 Methane Mitigation and Reduction

- ***Vapour Recovery Units (VRUs):*** Technologies to recover vapours, including ejector-based, cryogenic, and membrane-based vapour recovery systems.
- ***Storage Tank Emissions Control:*** Solutions such as internal and external floating roofs and low-emission tank seals. Upstream process controls and inlet alternatives. Tank venting: combustion or oxidation.
- ***Vented Methane Capture Solutions:*** Pressure Swing Adsorption (PSA), Temperature Swing Adsorption (TSA), activated carbon fibre adsorption beds, and Metal-Organic Framework (MOF) adsorbents.
- ***Compressor Seal Improvements:*** Innovations in dry gas seals, advanced wet seals, hybrid seal systems, carbon ring seals, and real-time seal monitoring systems.
- ***Zero Emission Pneumatic Controllers:*** Technologies like electric actuators, solar-powered pneumatic controllers, and instrument air systems.
- ***Flare Reduction:*** Enclosed ground flares, micro-LNG production units, gas-to-wire technologies, gas reinjection systems, and methane-to-methanol conversion units.
- ***Surface Casing Vent Flow (SCVF)/Gas Migration Prevention or Mitigation:*** Solutions including thermosetting polymer sealants, expandable tubular liners, cement squeeze techniques, casing patch systems, and wellbore integrity logging tools.
- ***Catalytic Heater Improvement or Alternative:*** Improve oxidation efficiency to >95% for natural gas-fueled heaters that can be deployed to Class I, Divisions 1 & 2, Group D hazardous locations. Evidence that >95% oxidation efficiency is maintained for product life (~10 years).
- ***Intermittent methane emissions destruction technologies:*** Technologies to destroy small intermittent quantities of methane (such as those from pneumatic instruments or compressor seals).
- ***Compressor Package Methane Emission Reduction:*** Advancements such as oxidation catalysts with extended service life, after-treatment systems tailored for natural gas engines, and methane-selective membranes. Solutions that integrate retrofit capabilities for legacy compressor fleets. Digital solutions that minimize methane emissions during transient operations are of particular interest.
- *Other innovative methane solutions tailored to address emissions from Compressors Stations, Engine Exhaust, Fugitives, Glycol Dehydrators, Well Workover & Completion, Pipelines and Metering stations*

3.2 Methane Measurement and Quantification

- ***Quantification Solutions:***
    - Software and digital solutions for real-time monitoring and data analysis with the goal of providing business intelligence that will help drive mitigating methane emissions. Methane prediction schemes employing machine learning algorithms or custom dataset creations are of particular interest.
    - Hardware such as laser-based systems, infrared cameras, and other related cameras or technologies that leverage spectroscopy.
    - Utilization of gas chromatography technology for precise methane detection.
    - Solutions that give operators the ability to improve localization of fugitives to the component or equipment level.
- ***LDAR (Leak Detection and Repair) Technologies:***
    - **Top-down Measurement Technologies:**
        - Drones for aerial methane sensing (targeting emissions less than 10 kg/h, targeting 1 kg/h or less).
        - Arial for long-range pipeline surveys (targeting emissions less than 10 kg/h, targeting 1 kg/h or less).
        - Satellites for aerial methane plume detection. (Targeting emissions less than 150 kg/h)
        - Continuous methane detection solutions for tower platforms
    - **Land-based Measurement Technologies:**
        - Point sensors (fixed or portable) for specific location monitoring.
        - Handheld Optical Gas Imaging (OGI) and other technologies for continuous on-site methane leak detection, visualization, and quantification.
        - Mobile ground labs (vehicles) equipped with advanced detection instruments for on-the-go monitoring.
    - Other innovative software/hardware integration technologies for comprehensive monitoring and reporting.

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