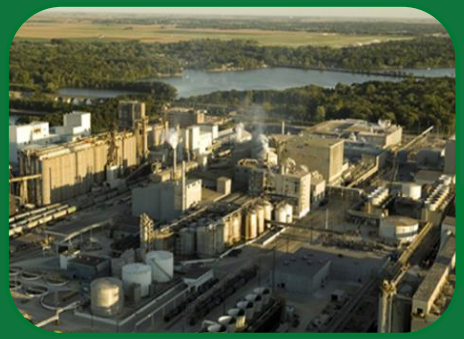
U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

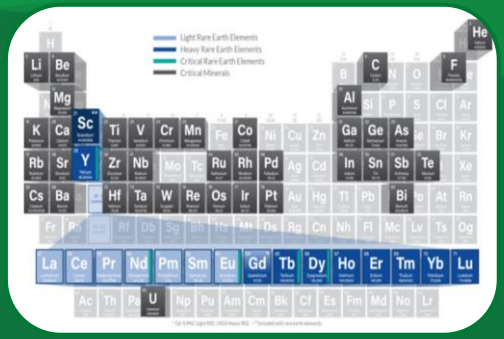
FECM's Methane Emissions Reduction Efforts for End-of-Life Assets

Western Tribal Carbon Management Strategies Forum - Spring 2024

May 01, 2024

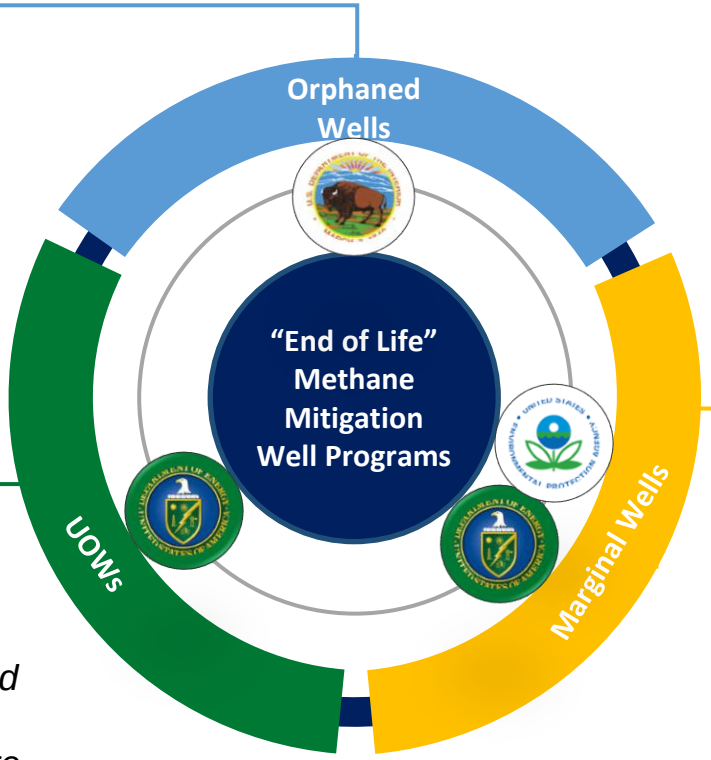
Cyrus Kian, Ph.D.





Federal Methane Reduction Programs for End-of-Life Assets

DOI Orphaned Wells Program
Purpose: *Support plugging and abandonment operations across Federal, Tribal, State, and private lands.*
Budget: *$4.7 billion to be obligated by 2030*



** A marginal well is defined as a well producing less than 15 barrels of oil equivalent per day (BOED) or 90,000 cubic feet of natural gas per day.*

DOE Undocumented Orphaned Well (UOW) Program
Purpose: *Develop technologies and techniques to identify and characterize orphaned wells that are not currently in the regulatory inventory*
Budget: *$30 million over 5 years*

DOE/EPA Methane Emissions Reduction Program (MERP)
Purpose: *Assess marginal well* methane emissions, prioritize methane mitigation opportunities, plugging/repairing wells and surface reclamation*
Budget: *$1.3 billion to remain available until September 30, 2028*

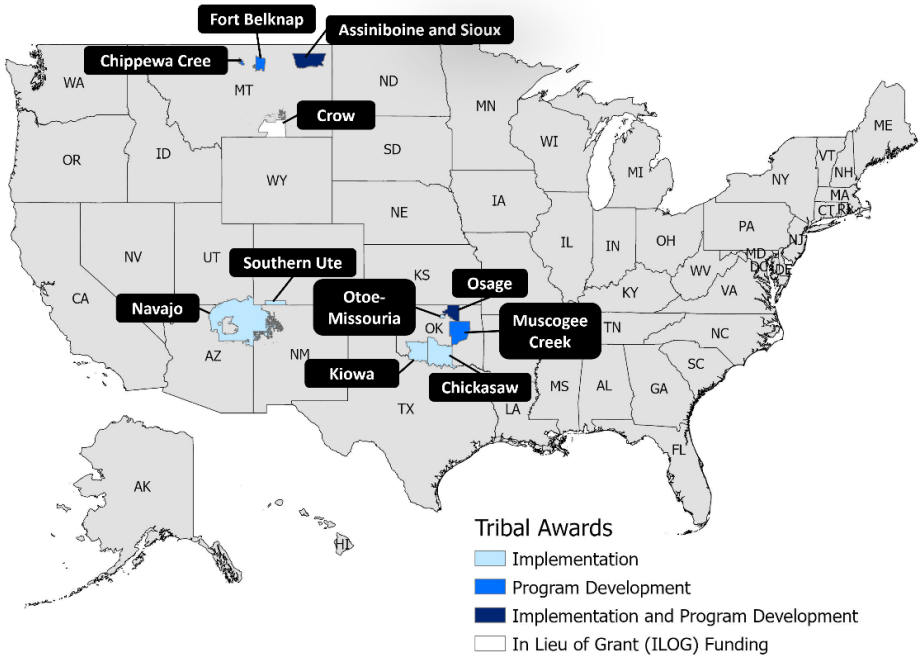
Tribal Orphaned Wells Program

Department of the Interior
Orphaned Wells Program Office

- BIL (P.L. 117-58) appropriated **$150M for wells on Tribal lands**
- Phase 1 Tribal OWP awarded $40.4M

Phase 2 Applications accepted through May 14, 2024:

- **Program Development Grants** fund capacity-building activities (e.g., inventory and assessment of orphaned wells, data and contract management, etc.)
  - Limited to $1M per applicant per year
- **Implementation Grants** fund plugging, remediation, and reclamation of orphaned wells/sites, as well as inventory and assessment activities
  - Subject to 10% administrative cap
  - Limited to $15M per applicant



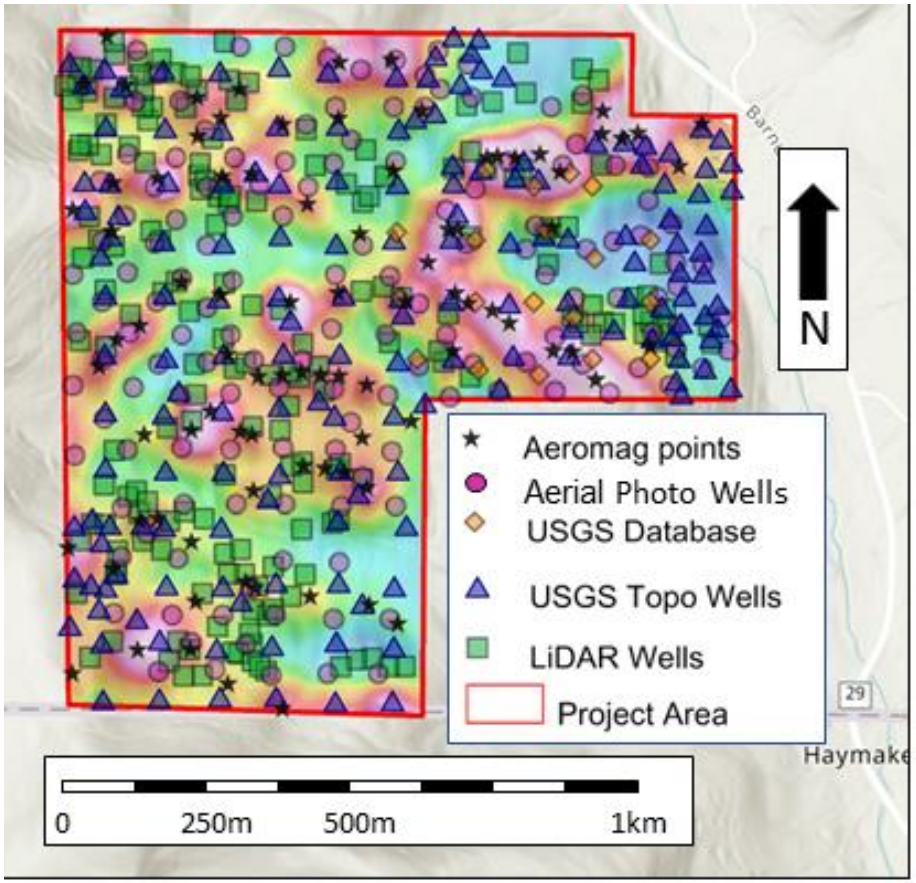
Requests reviewed on a rolling basis through September 30, 2024:

In Lieu of Grant Projects (ILOG) provide funding when Tribes request that DOI carry out plugging, remediation, and reclamation activities at orphaned wells/sites on Tribal lands

Guidance, application templates, links to weekly office hours, and contact info available at https://www.doi.gov/tribal-orphaned-wells-program & https://www.bia.gov/service/orphaned-wells

Undocumented Orphan Wells: There's no silver bullet for identification

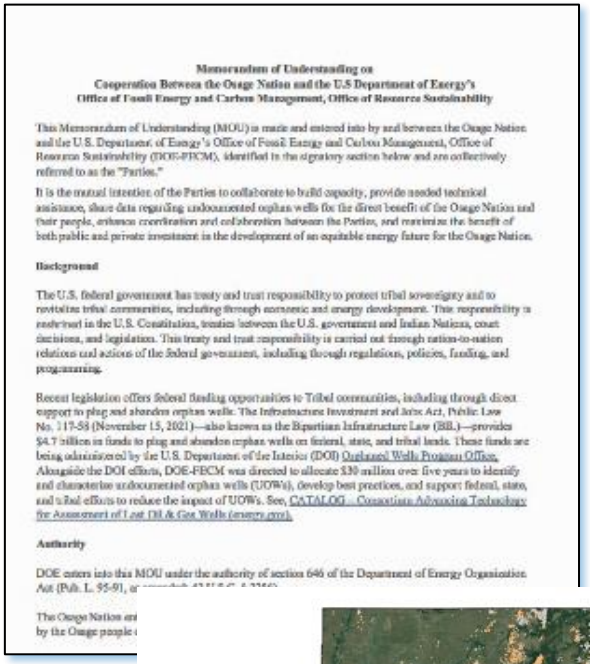
- Various methods can be used to locate wells
  - magnetic survey, aerial or satellite photography, LiDAR, methane measurements, historical records
- No method works in all cases
  - Magnetics fail when the well casing is removed (~15,000 wells had casings salvaged during WW2 for the metal) and is challenging in steep terrain or tall vegetation
  - Methane measurements fail when the well is not emitting (emissions are highly transient)
  - Aerial/satellite photos could be obstructed by vegetation or construction



Osage Nation

FECM and the Osage Nation executed a Memorandum of Understanding (MOU) as a framework for collaboration to:

- Build capacity, provide needed technical assistance, share data the direct benefit of the Osage Nation and its people.
- Maximize the benefit of both public and private investment in the development of an equitable energy future for the Osage Nation.
- Employ historical record searches, aerial drone surveys, and on-ground measurements.
- Support the development of the Osage Nation's own undocumented orphan well identification capabilities.
- Osage County is the first large field deployment for UOWP



Memorandum of Understanding on
Cooperation Between the Osage Nation and the U.S Department of Energy's
Office of Fossil Energy and Carbon Management, Office of Resource Sustainability

This Memorandum of Understanding (MOU) is made and entered into by and between the Osage Nation and the U.S. Department of Energy's Office of Fossil Energy and Carbon Management, Office of Resource Sustainability (DOE-FECM), identified in the signatory section below and are collectively referred to as the "Parties."

It is the mutual intention of the Parties to collaborate to build capacity, provide needed technical assistance, share data regarding undocumented orphan wells for the direct benefit of the Osage Nation and their people, enhance coordination and collaboration between the Parties, and maximize the benefit of both public and private investment in the development of an equitable energy future for the Osage Nation.

Background

The U.S. federal government has treaty and trust responsibility to protect tribal sovereignty and to revitalize tribal communities, including through economic and energy development. This responsibility is enshrined in the U.S. Constitution, treaties between the U.S. government and Indian Nations, court decisions, and legislation. This treaty and trust responsibility is carried out through nation-to-nation relations and actions of the federal government, including through regulations, policies, funding, and programming.

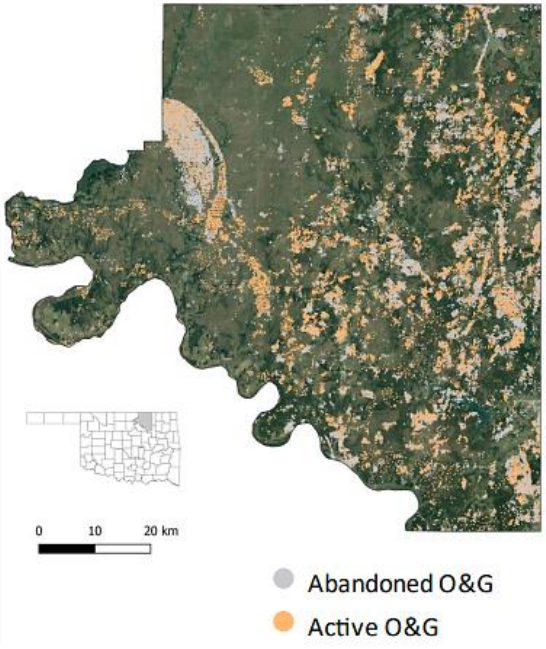
Recent legislation offers federal funding opportunities to Tribal communities, including through direct support to plug and abandon orphan wells. The Infrastructure Investment and Jobs Act, Public Law No. 117-58 (November 15, 2021)—also known as the Bipartisan Infrastructure Law (BIL)—provides $4.7 billion in funds to plug and abandon orphan wells on federal, state, and tribal lands. These funds are being administered by the U.S. Department of the Interior (DOI) Orphaned Wells Program Office. Alongside the DOI efforts, DOE-FECM was directed to allocate $30 million over five years to identify and characterize undocumented orphan wells (UOWs), develop best practices, and support federal, state, and tribal efforts to reduce the impact of UOWs. See, CATALOG – Consortium Advancing Technology for Assessment of Lost Oil & Gas Wells (energy.gov).

Authority

DOE enters into this MOU under the authority of section 646 of the Department of Energy Organization Act (Pub. L. 95-91, as

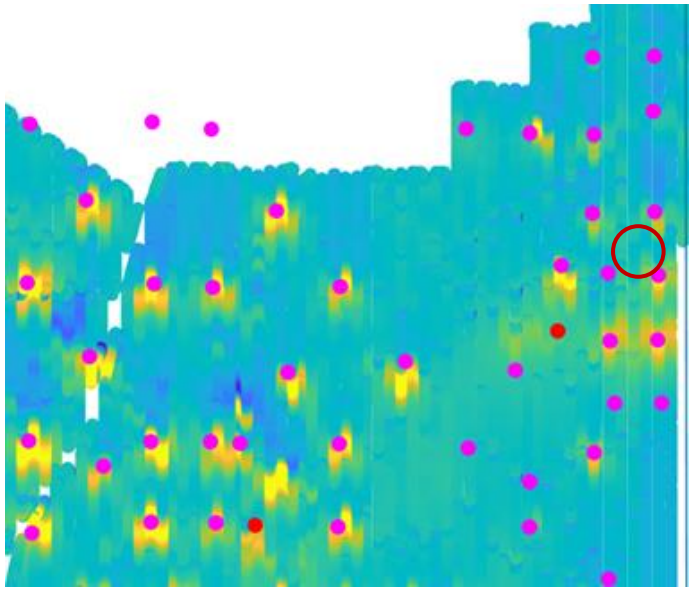
The Osage Nation

by the Osage people

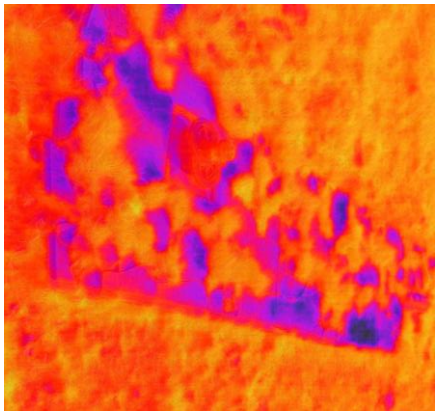


[Osage Minerals Council to Continue Environmental Hazard Clean Up | Osage Nation (osagenation-nsn.gov)]

UOWP: Identify a robust set of sensors that can efficiently locate orphaned wells



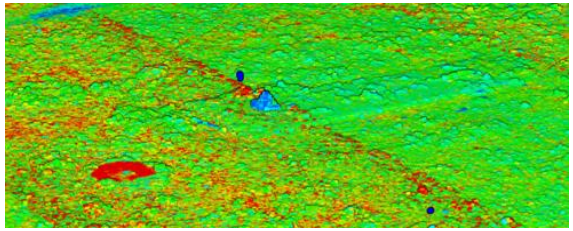
Magnetometer



Thermal

Overhead imagery

Lidar w/RGB coloring



Lidar reflectivity

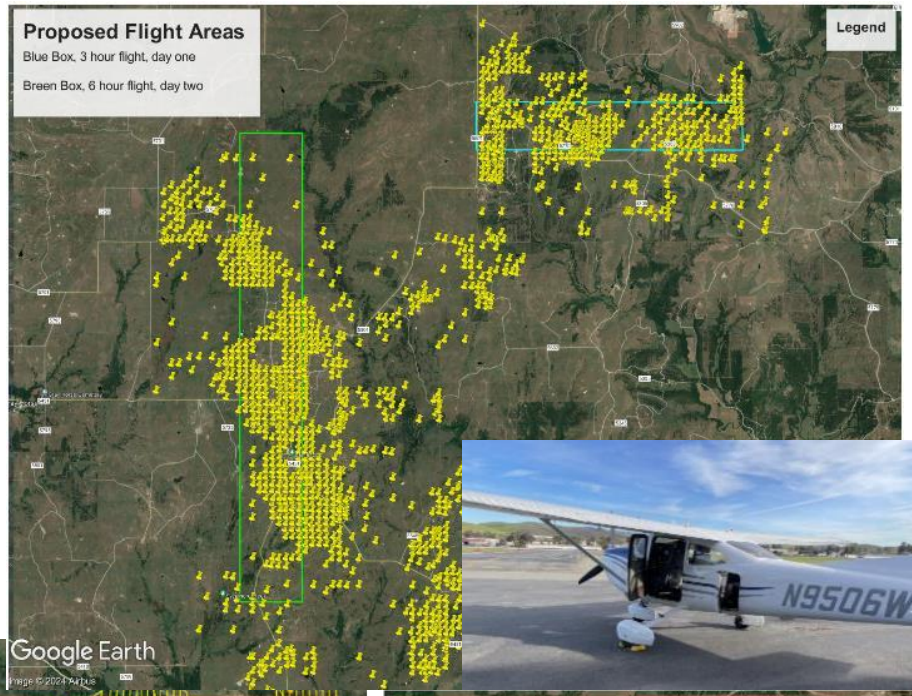
Topo map well with well head clearly seen in imagery but not in magnetometer

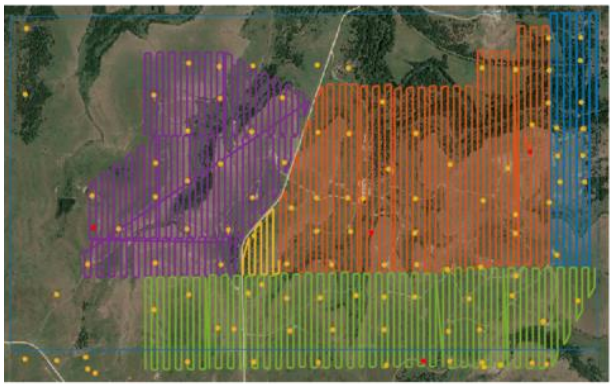
LLNL-PRES-862255

UOWP: Deploying multiple sensors at scale

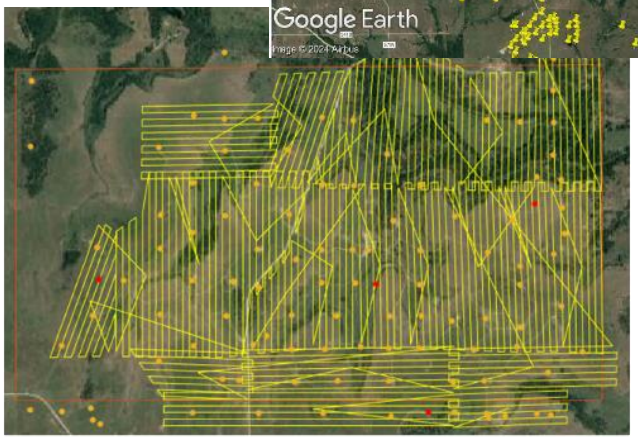
Manned aircraft with hyperspectral camera to test scaling detection of “super-emitters”

- Lidar/RGB
- Magnetometer
- UAV hyperspectral
- PolSar

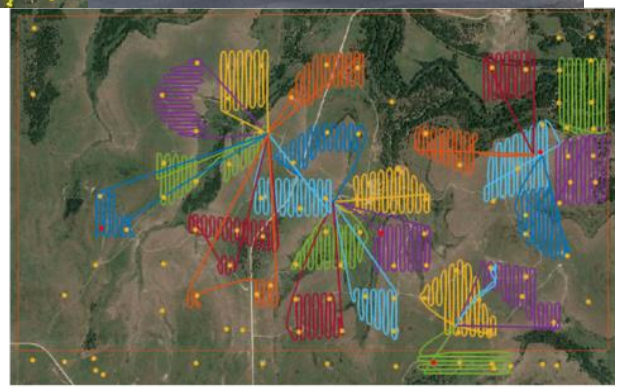




Mag Flight Tracks



Lidar/RGB camera Flight Tracks



HSI Flight Tracks

Methane Emissions Reduction Program (MERP)

- In August 2022, the Inflation Reduction Act (Section 60113) provided new authorities under Clean Air Act Section 136 to reduce methane emissions from oil and gas operations.
- $1.55 billion was made available to EPA to reduce methane emissions across from oil and natural gas operations through financial and technical assistance efforts.
- EPA and DOE are collaborating to leverage our shared commitment and joint expertise in advancing methane monitoring and reduction technologies and, also tap into DOE's expertise on planning and implementing financial and technical assistance efforts.
- **Non-Competitive** – In 2023, provided $350 Million to state agencies for the permanent plugging and abandonment of marginal conventional wells (MCWs)* on non-Federal lands (voluntary basis).
- **Competitive** – In 2024, provide up to $1 billion under a competitive solicitation to pursue broad scale methane emissions monitoring and mitigation across oil and gas sector, including tribal lands

* A MCW produces <15 BOED or <90 MCFD

Methane Emissions Reduction Program (MERP)

“Phase 1”
2023 Non-competitive State Awardees

On a voluntary basis, funding provided towards the measurement and permanent plugging of low producing oil & gas wells with high methane emissions

- Texas Commission on Environmental Quality
- Pennsylvania Department of Environmental Protection
- West Virginia Department of Environmental Protection
- California State Lands Commission
- Ohio Department of Natural Resources
- Illinois Department of Natural Resources
- Louisiana Department of Natural Resources
- New Mexico Department of Energy, Minerals, and Natural Resources
- Kentucky Energy and Environment Cabinet
- Colorado Department of Natural Resources
- New York State Department of Environmental Conservation
- Michigan Department of Environment, Great Lakes, and Energy
- State of Utah Department of Environmental Quality
- State of Virginia Department of Energy

Phase 2 Competitive Funding Opportunity

Methane Emissions Reduction from Existing Wells and Infrastructure

a. Assist **smaller operators** in mitigating emissions from MCWs* through equipment repairs
b. Assist **upstream and midstream operators/service companies** in mitigating emissions from production facilities and associated infrastructure
c. Assist **tribes** in mitigating emissions from MCWs and associated infrastructure

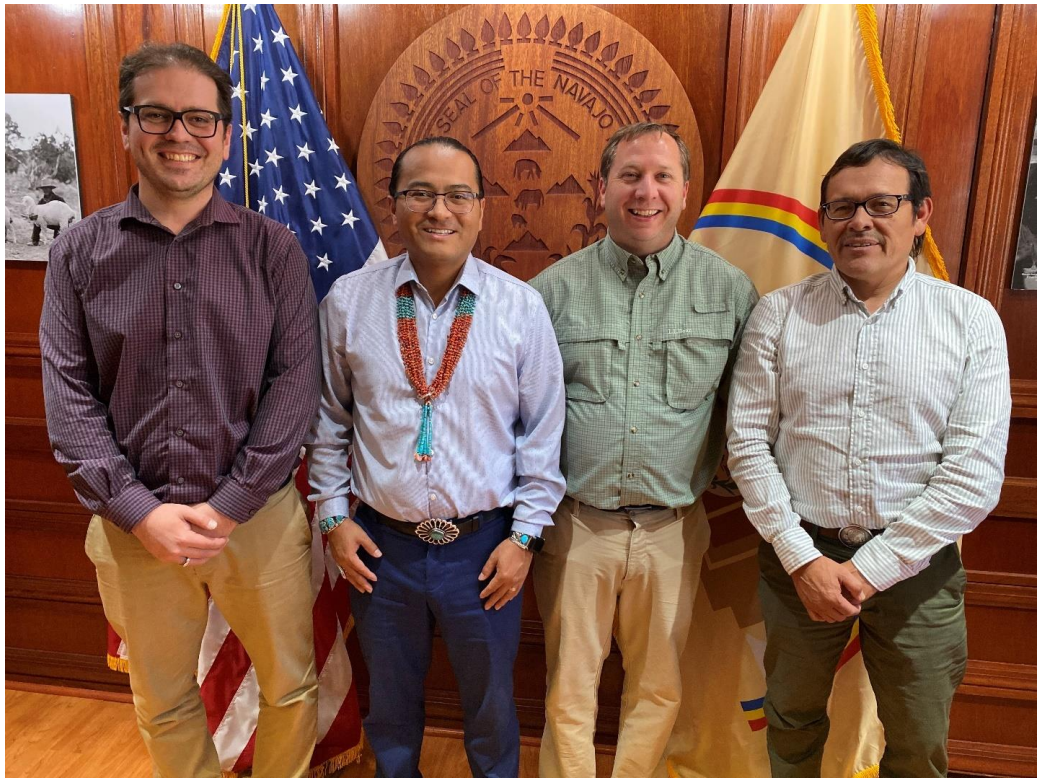
Accelerating Deployment of Methane Emissions Reduction Solutions

a. Technology validation and implementation of compressor and engine technologies
b. Technology validation and implementation of flare gas reduction technologies
c. Innovative "disruptive" technology development for advanced methane mitigation

Accelerating Deployment of Methane Emissions Monitoring Solutions

a. Drive emissions reduction through multi-scale, region-specific, and measurement-informed methane emissions data collection from oil and natural gas operations
b. Quantify emissions reduction by validating new monitoring technologies, processing algorithms, and data collection methodologies

FECM Tribal Engagement Efforts



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