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GOOGLE EARTH ENGINE
FOR METHANE EMISSIONS QUANTIFICATION FROM ORPHAN WELLS

Deloitte's methane emissions quantification solution — built on Google Earth Engine — is a geospatial Artificial Intelligence (AI) and Machine Learning (ML) analytics tool designed for organizations to monitor, quantify, and prioritize closure of problematic orphan wells to reduce methane emissions, protect water and air, and mitigate safety risks to improve human and environmental health.

BUSINESS CHALLENGES

Public organizations face a growing number of challenges in identifying and closing orphaned wells including:

Monitoring and quantifying methane emissions from orphan wells

Locating and assessing the condition of orphan wells, estimating the associated methane emissions, and determining the best course of action require significant effort and resources

Administrating and adhering to regulatory compliance

Navigating complex regulatory frameworks to ensure compliance with environmental regulations and grant requirements related to methane emissions and orphan wells; this involves state and local agencies monitoring and enforcing compliance with emission standards, permitting requirements, and reporting obligations

Prioritizing constrained resources

Monitoring and addressing high methane emissions orphan wells require significant financial resources, technical expertise, and specialized equipment. Limited budgets and personnel can hinder the ability of agencies to effectively address these challenges

SOLUTION OVERVIEW

Deloitte's methane emissions quantification accelerator integrates methane emissions satellite data with robust AI/ML predictive analysis and intuitive dashboards to help agencies improve the environment and public safety.

Satellite Imagery Analysis

Access a vast archive of satellite imagery via Google Earth Engine Data Catalog, as well as data from other satellites and drone sensors to analyze methane hotspots and emissions patterns across different regions

Data Integrations

Integrate data from various sources including ground-based sensors, satellite imagery, and climate models, to better inform decision-making and support prioritization efforts

Interactive Maps

Visualize orphan wells and methane emissions to explore and navigate geographic information by interacting with the map interface

Actionable Analysis

Detect and quantify methane emissions from various sources using methane detection algorithms driven by Artificial Intelligence and Machine Learning to prioritize the closure of wells based on their emission levels

Reporting and Compliance

Leverage built-in tools for data management, analysis, and visualization to generate accurate reports for the public or to meet regulatory requirements

POTENTIAL OUTCOMES AND BENEFITS

Deloitte's methane emissions quantification accelerator assists agencies with sustainability initiatives, helping them both strategically and tactically:

- **Identify and prioritize the closure of** high methane-emitting orphan wells
- **Optimize financial and organizational resources** dedicated to monitoring orphan wells and well-closing efforts
- **Improve regulatory reporting** with near-real-time data on methane emissions for individual wells
- **Protect groundwater and improve air quality** by prioritizing the sealing of orphan wells that pose a risk of contaminating groundwater aquifers or have negative effects on air quality
- **Build trust with the public** by demonstrating a commitment to environmental stewardship, public safety, and responsible resource management

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Deloitte's Google Earth Engine models for methane quantification can help an organization understand, monitor, and act on near-real time information about methane emissions from orphan wells.

UNDERSTAND

Locate and understand spatial distribution of orphan wells

Determine proximity to sensitive areas such as water bodies, residential areas, or protected lands

Communicate status and progress of orphan well initiatives in public outreach programs

MONITOR

Monitor existing known orphan wells and quantify current methane emissions

Monitor methane emissions for abnormal trends or spikes

ACT

Prioritize the closure of orphan wells

Measure quality of well closure and site restoration efforts

Conduct post-disaster assessments

Why Deloitte and Google Cloud

In 2025, Deloitte's strong collaboration with Google Cloud was recognized with four Partner of the Year awards, including Industry Solutions Partner of the Year – Government. This award underscores Deloitte's commitment to delivering cutting-edge solutions and reflects our deep understanding of the evolving public sector landscape.

This recognition builds upon a consistent record of success. Deloitte was also named Google Cloud Global Partner of the Year for Public Sector in 2023 and has received numerous other Partner of the Year awards and acknowledgments since 2017. This long-standing achievement highlights Deloitte's proven ability to deliver innovative Google Cloud solutions that address the increasingly complex challenges faced by clients.

Get in touch

Vishal Kapur
Lead Alliance Partner
Deloitte Consulting LLP
vkapur@deloitte.com

Anant Dinamani
Principal
Deloitte Consulting LLP
adinamani@deloitte.com

Aleks Ontman
Senior Manager
Deloitte Consulting LLP
aontman@deloitte.com

Melissa McConnell
Senior Manager
Deloitte Consulting LLP
memcconnell@deloitte.com