Smart Methane Emission Detection System Goes Airborne

The National Energy Technology Laboratory (NETL) in partnership with the Southwest Research Institute

The autonomous, real-time methane leak detection system facilitates early detection of emissions before they become a problem.

Innovation

NETL is expanding its work with the Southwest Research Institute (SwRI) of San Antonio, Texas, to develop the next generation of methane leak detection technology to help more effectively alleviate methane emissions from multiple operations in the natural gas industry.

The objective of the new research is to develop an airborne, autonomous, real-time leak detection technology that applies machine learning techniques to passive optical sensing modalities to mitigate emissions through early detection.

NETL has supported SwRI work on the Smart Methane Emission Detection System (SLED/M) since 2016, and key progress has been made on a system that monitors various regions of a gas pipeline facility and interacts with natural gas mitigation technologies. Now, the technology is being advanced to include aerial operation.

Outcomes

Technology Advancement

Existing methane detection technologies have deficiencies including high false alarm rates. They also require operators to process the data in real-time or in post-process. The SLED/M approach has demonstrated low false alarm rates and a reduction in both response time to leak detection and operational costs. In addition, the approach does not require a human in the loop, which minimizes error. SLED/M is a nonintrusive passive technology meaning there is no need to retrofit existing equipment and facilities, eliminating safety and operational restrictions.

Impact

Fugitive emissions from compressors is one of the largest sources of methane emissions in the midstream sector of the natural gas industry. SwRI reports that 50 percent of fugitive emissions are from major compressor equipment, and 10 percent of emitting sites contributed to 50 percent of the overall methane emissions.



Airborne, autonomous, real-time methane leak detection is on the horizon.

"This technology is an attractive option to industry not only because it is more efficient than existing methods, but also because having a system that is mobile and capable of monitoring multiple facilities and miles of pipelines in a day saves significant operational and non-recurring costs. There is a clear need for this solution - one that is autonomous, safe, non-intrusive, timely and capable of operating from an aerial platform such as a drone."¹

Brian J. Anderson, Ph.D., Director, NETL

Timeline

2016: Project with SwRI begins.

- **2017:** Algorithm and Protype developed.
- **2018:** Protype tested and demonstrated.
- **2019:** Development of aerial system.

¹News Story. <u>netl.doe.gov/node/8139</u>

- ² ASME Article: <u>asme.org/topics-resources/content/machine-learning-applies-pipeline-leaks</u>
- ³News Story. <u>wvnews.com/news/wvnews/netl-southwest-</u> <u>research-institute-develops-new-methane-</u> <u>detectors/article 1605789b-8875-5fff-9bb0-</u> <u>d434245bb1ba.html</u>
- ⁴ Video Segment. <u>video.klrn.org/video/march-14-2019-tech-</u> <u>detects-methane-gas-leaks-wxb80n/</u>



