

The Methane Detectors Challenge

Crowdsourcing Innovative Technologies to Curb Methane Emissions

The Methane Detectors Challenge (MDC) is an initiative by Environmental Defense Fund, seven oil and gas companies and other nonprofit and university partners to test and validate next-generation methane monitoring devices that can be commercially deployed to help the oil and gas industry quickly find and fix methane leaks.

EDF and its partners have sought out innovative detection systems that can provide continuous monitoring of methane emissions at a low cost. Technologies that provide continuous detection to reduce methane emissions bring environmental and economic benefits:

- Capturing methane emissions, along with volatile organic compounds and hazardous air pollutants, provides the dual advantage of decelerating the rate of warming and improving local air quality; and
- Leaks that are quickly identified and repaired preserve gas supply that can then be sold.

Companies and research teams taking part in the Challenge have the unique opportunity to interact with leaders in the energy development and environmental sectors, gain first mover advantage for a new emerging market and help address one of the world's most pressing climate risks.

Solutions Offered From Around the World

Twenty teams submitted proposals during the application process from countries spanning the globe, including South Africa, Singapore, Sweden and China. The types of technologies offered to meet the proposed specifications also ranged widely, from infrared lasers to integrated sensor circuit boards, from fresh-from-the-lab prototypes to off-the-shelf technologies.

Proposals were assessed and critically examined by EDF, the companies and independent advisors. At the end of the review process, five of the most promising proposals were selected.

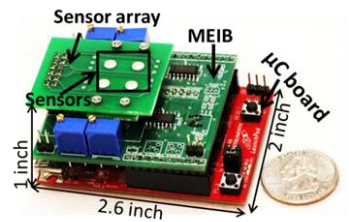
The Innovations in Round 1 Testing

• **PPM-Level Leak Detection for Methane:** Two firms adept in gas sensor development, Honeywell and the company's RAE Systems gas detection product division, and SenseAir AB, are adapting a handheld alcohol sensor and integrated continuous sampling system for low parts-per-million (PPM) methane and hydrocarbon detection. The extraordinarily sensitive handheld alcohol sensor is currently used in vehicles to detect high alcohol levels in drivers. This joint effort by Honeywell, a Fortune 100 company based in Morristown, New Jersey, and SenseAir, a firm from Delsbo, Sweden, with 25 years of gas-sensing experience and more than 20 U.S. and European patents in the field, provides an integrated systems approach matched with low costs and good leak detection performance.



• **Ultra-Low-Cost Electrochemical Sensor:**

The team from Oakland University (Rochester, Michigan) Chemistry Department is proposing a prototype electrochemical sensor solution with a target cost of \$30/sensor. The team has partnered up with engineers at Michigan State University to integrate it with miniaturized electronics and real-time data analysis of a sensor that was previously developed for mine safety applications.



• **Infrared Laser-Based Gas-Sensing System:**

An established firm from China, Dalian Actech, Inc. has teamed up with Foller & Associates of San Francisco, California to deliver an infrared laser-based methane detection system for continuous monitoring. Developed for and currently used in the Chinese coal industry, Dalian Actech is enhancing the methane sensitivity of its open-path sensing system for application in oil and gas operations. With a suite of available sensor products, including fixed networks and handheld gas-sensing devices, Dalian Actech comes to the Challenge with commercial experience in mass-manufactured gas detection technology.



• **Low-Cost, Methane-Specific Laser-Based System:**

Quanta3, LLC, a scientific and engineering firm from Longmont, Colorado, brings a methane-specific diode laser detection system to the Challenge. Quanta3 is enhancing its diode laser system to provide a complete, low-cost sensor package that does not require direct contact for detection. A small start-up company founded by a Boulder-based research engineer, Quanta3 has experience in the deployment of laser sensors developed to withstand extremely harsh conditions, including arctic and active volcano environments.



• **Sensor Network on a Single Circuit Board:** A research group at University of Colorado Boulder has proposed an integrated circuit board solution outfitted with a network of low-cost, commercially available sensors. Using off-the-shelf metal oxide sensors, this approach has the potential to detect methane and other hydrocarbons at a very low cost. The group's work in academia includes significant experience in sensor development and performance as well as data quantification methods.



Next Steps

Applicants will bring their technologies to San Antonio, Texas for the first round of testing at Southwest Research Institute's facilities, which is scheduled to be completed in fall of 2014. The second phase of laboratory and field testing is scheduled for late spring/early summer of 2015, providing more intensive testing and evaluation. Industry pilot purchases and deployment make up the third phase of the Challenge, scheduled to commence in late 2015, testing the most promising technologies in the field at participating oil and gas company facilities.