

# 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, university, and government 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.

Technology 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, China, and the United States. 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 initial review process, five of the most promising proposals were selected.

Laboratory testing of the five technologies was conducted in fall 2014 at Southwest Research Institute. The technologies

generally performed well in detecting methane concentrations over a range of temperature and humidity conditions. The following four technologies and the participating companies were selected by EDF and its partners to advance to round 2 testing.

### The Innovations in Round 2 Testing

• **PPM-Level Leak Detection for Methane: SenseAir AB**, a Delsbo, Sweden firm adept in gas sensor development, is 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 effort by SenseAir, a firm 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.



• **Sensor Network on a Single Circuit Board:** A research group at **University of Colorado Boulder** partnering with NDP Group, a Boulder-based engineering firm focusing on systems design, 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.

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

An established firm from China, **Dalian Actech**, Inc. has teamed up with **Foller &**

**Associates** of San Francisco, California and **SenSevere** of Pittsburgh, Pennsylvania to deliver an infrared laser-based methane detection system for continuous monitoring.,

Dalian Actech is enhancing the methane sensitivity of its open-path sensing system, originally developed for and currently used in the Chinese coal industry, 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. SenSevere is a start-up company that grew out of Carnegie Mellon and has experience with sensing in harsh environments and responsibility for packaging and analytics for the Dalian system.



• **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. A small start-up company founded by a Longmont, Colorado-based research engineer, Quanta3 has experience in the deployment of laser sensors developed to withstand extremely harsh conditions, including arctic and active volcano environments.



## Next Steps

The second phase of laboratory and field testing for these technologies is proceeding in San Antonio, Texas throughout late spring and summer of 2015, providing more intensive indoor and outdoor testing and evaluation. Industry pilot purchases and deployment will 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.