

Stanford/EDF Mobile Monitoring Challenge

Application Form

Application deadline: 11:59 p.m. EST, October 31st 2017

Email Filled application to: arvindr@stanford.edu or abrandt@stanford.edu

Thank you for your interest in the *Stanford/EDF Mobile Monitoring Challenge*. The aim of this challenge is to test technologies that would be useful for rapid, mobile, and/or remote detection and quantification of methane leaks. Such technologies could provide rapid and low-cost assessments of significant emissions sources over a large number of facilities. We look forward to reviewing your application.

We ask that applicants not disclose proprietary or confidential business information as part of any provided description of sensor operation. If you cannot answer any of the questions on this application because of confidentiality, simply mention this as part of the answer.

We would like to ensure a good match between our field capabilities and sensor abilities so that all parties involved can derive maximum benefit from this study. In this spirit, we ask that you answer the following questions with as much as detail as is possible without divulging sensitive information.

Please note that Stanford will publish the results and analysis from this study in peer-reviewed journals. While technologies will be identified with the name of the company or university, no confidential or proprietary information will be disclosed.

By submitting this document with my typed name below, I acknowledge that it contains no confidential business information and that Stanford University, Environmental Defense Fund, and select independent experts will review it.

Typed Name

Position

Organization

Note: Please submit the application as an MS Word file. Attachments may include MS Word or PDF formats. The application form and attachments may not exceed 10 pages or 5 MB in size.

Part 1 (Required)

General Information

1. Please provide contact information for the person responsible for this project application. Please include name, position/title, contact number, email address, and physical address.
2. Is this a methane-only sensor or a multi-gas sensing system? If so, please explain what other co-emitted species are measured.
3. If selected, you will be required to transport your sensor to a field site. The field site is located near Sacramento, CA. In that scenario, how many personnel would be involved to operate the sensor as a mobile monitor (e.g., one pilot and one operator)?
4. Please comment on the stage of development for your sensor, associated system (battery, solar, etc.), and supporting quantification methodology, if any. Choose one: (1) research and development, (2) testing and prototype stage, or (3) available in the market. Elaborate if your technology does not strictly fall under one of these categories.
5. If you anticipate being on the market with your technology (either as a technology supplier or a service provider), please provide an estimated time when it will be available. (e.g., late 2018).

Part 2 (Required)

Sensor Technical Specifications

1. Describe briefly the physical mechanism underlying your sensor (e.g., infrared imaging, absorption spectroscopy, hyperspectral imaging, thermal, non-thermal, chemical cell, FID, acoustic, etc.)
2. What are the sensor's absolute minimum and maximum detection limits (in any relevant units)? At what distances and meteorological conditions have these been tested? If available, please include the saturation limit of your sensor. Note whether test data are publically available.
3. What is the precision of the sensor? Describe how the precision was determined. Note whether test data are publically available.
4. Describe the deployment platform for the sensor. (e.g., mounted on a light aircraft, satellite, drone, ground-based mobile sensor, mast mounted, etc.). We are specifically looking for mobile solutions, which excludes systems including hand-held devices, fixed point sensors, or passive boundary scanners.
5. Does the sensor require line-of-sight access to the leak source to detect a methane plume?
6. Describe the type of measurement (e.g., single point, continuous, fixed-rate, variable-rate, etc.). If you collect data periodically, specify frequency. What output data are generated? (i.e., concentration enhancement, volumetric/ mass emissions rate, flux, ambient conditions.)
7. In order to estimate emission magnitude, do you need to collect other relevant parameters like wind speed, temperature, radiance, etc. If so, please specify the parameters and whether your system simultaneously collects this data.

8. How frequently do you have to calibrate the system? Do/Can you perform calibration measurements on-site? If not, please specify how your detector will be calibrated.
9. How much time before and after a measurement does your system require to produce a preliminary quantitative emission estimate? What additional time is required for data processing and quality assurance before a final result is provided?
10. What are the power or other requirements for the sensor and system? Please specify how you plan to supply power to your detector during the field test.
11. If a battery or an on-board power source (car or plane) does not power your system, what power requirements would you need on site?
12. List any operating limits for your sensor for the following variables:
 - a. Temperature (ambient):
 - b. Temperature gradient:
 - c. Humidity:
 - d. Wind (direction and speed):
 - e. Solar radiation (cloud cover tolerance):
 - f. Background scene:
13. What is the format of the results provided by your system?
14. How will the results be made available to the research team during or immediately after the tests?
15. Is the sensor suitable for use in an environment where gas is present in ignitable concentrations? Please list any certification acquired.
16. What areas would your technology need improvement to accelerate its development?

Part 3 (Required)

Commercial Viability

1. What is the fundamental goal and the value created by your solution?
2. How might your solution compare to more established approaches to identifying leaks, such as handheld, on-site deployment of optical gas imaging cameras? What are key points of differentiation?
3. How do you consider tradeoffs between parameters of detection sensitivity, monitoring frequency, and monitoring cost, in the context of seeking solutions that provide equal or greater environmental benefit to established approaches?
4. Is your marketing strategy a sensor-as-product or sensing-as-service type system?
5. Are you using commercially available sensor / sensor-components for your system? If not, what is the status of the IP? If it is owned by someone else, what rights (exclusive / non-exclusive) do you have to utilize it?
6. If someone were to purchase the sensor today, what would it cost? (Please explain any relevant metrics or assumptions, e.g., cost to survey 1000 wells across 100 sq. miles. If you are using a sensing-as-service type strategy, use any relevant metric)
7. If your sensor were mass-produced, what is your estimate of what it would cost to build: 100 units? 10,000 units? Please provide rationale and identify costs excluded from your estimate.
8. What stage(s) and/or facility type(s) in the natural gas supply chain are the prime candidate(s) for your solution?
9. If you are looking to commercialize your detector, when do you expect a product/service to be available?

10. If you have a sensor-as-product strategy, what expertise is required to operate? If so, what kind of training requirements will be required of a potential operator?
11. [For academic or other non-business sector applicants]: Do you aspire to seek commercialization for your innovation? What types of path(s) to commercialization are you assessing?
12. Have you applied to or participated in other technology development initiatives sponsored by governments, industry, consortiums, etc.? Examples include EDF Methane Detectors Challenge, Natural Gas STAR workshops, Emission Reduction Alberta (EBA), World Bank, etc.