

## Open-Source High Flow Sampler Development

The California Air Resources Board (CARB) is funding a project, led by Colorado State University (CSU), to develop and test a new design for a high flow sampler instrument (HFS) to quantify leaks from natural gas systems. The final product will include open-source specifications for the HFS that can be combined with final product development and safety certification to create a saleable instrument.

### BACKGROUND

CARB approved the Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Oil and Gas Regulation) in 2017 to reduce methane emissions in California. The Oil and Gas Regulation requires regulated entities to take actions to limit intentional (vented) and unintentional (leaked or fugitive) methane emissions from active and idle equipment and operations. Provisions of the Oil and Gas Regulation include methane emission rate standards for compressor vent stacks, low bleed natural gas-powered pneumatic devices, and well casing vents. The emission rate measurement requirements in the Oil and Gas Regulation are an important part of monitoring emissions and ensuring equipment is complying with the flow rate standards.

The only commercially available HFS is no longer being produced. Additionally, some studies have identified critical operating issues with that instrument, particularly with instrument accuracy when measuring gas with heavier hydrocarbons than are present in market natural gas. While existing instruments are near the end of their support life, the low lifetime sales quantities of an instrument, coupled with high development costs, make it unattractive to develop a next-generation instrument. CARB funded this study to make the development of a next-generation HFS less of a financial risk by identifying key required technologies and prototyping a working HFS.

### PROJECT OBJECTIVES

CSU will develop an open-source architecture for a next-generation HFS, including sourcing and construction instructions to build the instrument. The new design will aim to eliminate the critical operating issues identified for the previous discontinued design. The resulting HFS design will solidify operational methods for effective measurements and reduce the financial risk of developing a new instrument.

The open source design could be customized for a variety of target gas and aerosol species; therefore, the HFS will be useful for research and regulatory compliance in oil and gas and other industries, in addition to its critical role in implementing CARB's Oil and Gas Regulation.

## **PROJECT PLAN**

The project is structured as an early-stage product design effort: identifying requirements, prioritizing and selecting key subsystems, and integrating these into a working prototype. The study team, led by CSU, interacts heavily with a technical advisory board that is open to anyone interested in the design or use of the HFS. The advisory board meets periodically and has provided input on requirements and priorities for the work. As of November 2020, the study team is developing a HFS prototype and will conduct testing in the laboratory and in the field using CSU's Methane Emissions Technology Evaluation Center.

CARB will publish the final HFS specifications as open-source information. At the completion of the project, work will remain to develop a commercial instrument for sale. This may include additional testing, industrial design, production software, fabrication and test processes, and safety certification. CSU will work with potential manufacturing and distribution partners to achieve a high likelihood of the HFS being manufactured and available for purchase.

## **TIMELINE**

The project started in early 2020 and will finish in mid-2021. As of November 2020, the team is assembling the first prototype of the new HFS for testing. Laboratory and field testing will occur in early 2021.

## **CONTACT**

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