# Methane's short lifespan presents golden opportunity to quickly address climate change

November 10 2021, by Christina Procopiou

Oil and gas fields in Elk Hills, California are part of Berkeley Lab's SUMMATION project on methane monitoring. Credit: Andrew Moyes/Berkeley Lab

Sébastien Biraud is a Berkeley Lab scientist leading an effort to identify and mitigate some of the largest emitters of methane in California's Southern San Joaquin Valley. Methane is a short-lived air pollutant and greenhouse gas capable of warming the atmosphere about 80 times as fast as the far longer-lived carbon dioxide over 20 years. This month the U.S. and European Union launched the Global Methane Pledge at the United Nations Climate Change conference, in recognition of the chance countries have to slow climate change by tackling methane

emissions—possibly even before the end of this decade. Countries joining the pledge commit to a collective goal of reducing global methane emissions by at least 30% from 2020 levels before 2030 with a particular focus on sources of high emissions.

Since 2019 Biraud and team have been setting up a framework for pinpointing and monitoring these "super emitters" in California's Southern San Joaquin Valley, where more than 50% of methane emissions can be traced back to less than 10% of super emitters from the dairy and oil and gas industries. Their goal is to identify the super emitters at the scale of individual oil wells, fields, or entire regions, quantify the amount of methane emitted, then use that information to help inform mitigation approaches across California and elsewhere.

## Q. Why monitor methane? Why is it important to identify methane super-emitters?

Methane is emitted during energy production, raising livestock, and the decay of organic waste in landfills. Methane is what we call a "short-lived" climate forcer because it stays in the atmosphere for far less time than other greenhouse gasses such as carbon dioxide—10 years versus more than 100 years for $CO_2$. The molecular structure of methane is such that it is capable of warming the atmosphere about 80 times as fast as carbon dioxide. That's bad news for warming as there's evidence that methane could cause more warming over the next 10 years than $CO_2$.

Although this is clearly a challenge, this also presents a great opportunity to act: By reducing methane emissions, we can reduce methane induced-warming and slow down the rate of warming. If we do this right, there's potential to see results from cuts to methane emissions in as little as 10 years.

And that's where super-emitters come in. Multiple atmospheric studies have identified that methane emissions have been significantly underestimated by greenhouse gas inventories for the U.S., California, and select cities. Other studies have provided compelling evidence indicating that in California a relatively small number of super-emitters—in some cases 1 to 10% of potential sources—contribute more than half of the methane emissions. We can't make the reductions needed without addressing these super emitters.

## Q. Recent research identified a large methane hotspot over California's Central Valley. Why is it important to address this, and how is California working to do so?

Analysis of remote sensing data has identified that this hotspot, located in the California Central Valley, is likely to be the second largest hotspot over the entire U.S. This hotspot is associated with emissions from both the agriculture and energy sectors. Methane emissions from the energy sector are from leaks occurring during the extraction and distribution of natural gas, which present the cheapest opportunity to reduce methane emissions.

The state of California introduced Assembly Bill 1496 (AB1496) in 2015 to address this and requires the California Air Resources Board to target these high-emissions methane hotspots through monitoring and observation. Our ability to detect and mitigate these hotspots have rapidly advanced in recent years through the availability of new technologies. These include low-cost sensors, hand-held devices, mobile survey vehicles, and sophisticated sensors set up on communication towers, drones, aircrafts, and satellites.

Oil and gas fields in Poso Creek, California are part of Berkeley Lab's SUMMATION project on methane monitoring. Credit: Andrew Moyes/Berkeley Lab

## Q. What is the SUMMATION project and how does it differ from existing methane monitoring and accounting frameworks in California?

The SUMMATION project (short for SUper eMitters of Methane detection using Aircraft, Towers, and Intensive Observational Network) is aimed at developing a framework using these new technologies in a tiered observation system. Through SUMMATION, there will be 24/7

persistent monitoring using both low-cost and state-of-the art sensors to detect and quantify intermittent methane sources. We will conduct airborne campaigns to detect and quantify emissions from plumes over oil and gas fields where ground access is limited, and will run follow-up ground-based campaigns using mobile-survey technologies.

The Biden administration's plans announced in Glasgow acknowledge that there is a big problem with allowing methane leaks by super emitters to go undetected over years, if not decades. The administration has proposed rules that demand more frequent and strict testing for leaks, and taking a multi-pronged approach similar to the tiered-approach framework we developed for SUMMATION, as a way to meet such methane emissions reduction ambitious goals.

The project began in 2019 and many of the field research components were postponed due to the pandemic. However, we already can take lessons from the design and implementation of this project and our broader experience from other Berkeley Lab programs focused on analyzing and summarizing the advantages and drawbacks of different sets of methane detection techniques. SUMMATION will support the development and application of a methodology for validating scalable, cost-effective, and continuous monitoring systems in other key regions in California.

## Q. How will the SUMMATION project benefit the surrounding communities?

In California, the production of oil and gas occurs close to population centers. Many are associated with sources of methane (accidental leaks, venting), volatile organic compounds (VOCs), and other pollutants that can impact the health of local communities and degrade regional air quality.

The SUMMATION project has a very strong community engagement effort. The project team and its affiliated partner organizations are well experienced through years of work in the southern Southern San Joaquin Valley on issues of public health impacts from air pollution, methane emissions, and oil and gas operations generally. We have developed a strong standing in the local community by conducting outreach and policy advocacy in a variety of ways, primarily through schools, parent coffee hours and health fairs, and by using earned media and social media to enroll people in our local programs and communicate information. Our relationships with entities such as the Central California Environmental Justice Network (CCEJN), Kern County Public Health Department, local school districts, and the Kern County Asthma Coalition enable significant reach and exposure of the project's efforts on policies and solutions to reduce air quality impacts. This effort coincides with President Biden's American Rescue Plan (ARP) funding to improve ambient air quality monitoring for communities across the United States.

Provided by Lawrence Berkeley National Laboratory

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