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Congress of the United States
House of Representatives
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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December 2, 2021

Mr. Michael K. Wirth
Chairman and CEO
Chevron Corporation
6001 Bollinger Canyon Road, San Ramon, CA 94583

Dear Mr. Wirth:

The United States cannot achieve its targeted reduction in methane emissions under the Global Methane Pledge without a swift and large-scale decline in oil and gas sector methane leaks.[1] The existence of these leaks, as well as continued uncertainty regarding their size, duration, and frequency, threatens America's ability to avoid the worst impacts of climate change. I am concerned that oil and gas sector Leak Detection and Repair (LDAR) programs may not be designed and equipped to comprehensively monitor and detect methane leaks, particularly the intermittent, "super-emitting" leaks that are responsible for much of the sector's leak emissions. As a result, the Committee on Science, Space, and Technology is investigating whether existing LDAR programs possess the capabilities to achieve wide-ranging, quantifiable emission reductions from oil and gas sector methane leaks, and whether additional policies and research may be required to support a stronger Federal role in monitoring, quantifying, and evaluating methane leak emissions. To inform its inquiry, the Committee seeks information on the scientific, technological, and analytical frameworks that underlie private sector LDAR efforts.

The scientific foundation of methane's role as a contributor to climate change is well-established. Methane is a short-lived climate pollutant but it is far more potent than carbon dioxide for the duration of its atmospheric lifetime, with a global warming potential that is 84-87 times greater than carbon dioxide over a 20-year timeframe.[2] Atmospheric methane levels increased rapidly

[1] White House, "Joint US-EU Press Release on the Global Methane Pledge," September 18, 2021, https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/18/joint-us-eu-press-release-on-the-global-methane-pledge/.
[2] International Energy Agency, "Methane Tracker 2021," https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change.

over the past decade and reached their highest annual growth rate in 2020.[3] In the United States, oil and gas sector operations are the second largest source of methane, responsible for an estimated 30% of methane released due to human activities.[4] In its most recent report, the Intergovernmental Panel on Climate Change highlighted the need for "strong, rapid and sustained reductions in CH_4 emissions" to limit the intensity of anthropogenic climate change.[5]

Nevertheless, methane leaks – the release of methane due to malfunctions and abnormal operating conditions – remain widespread throughout U.S. oil and gas infrastructure. Their persistence raises concerns about whether existing LDAR practices in the United States are adequate to identify them. Indeed, a large and growing body of scientific evidence in recent years has found that oil and gas sector methane leaks are a much bigger problem than previously believed, and that the Federal Government systematically underestimates oil and gas sector methane emissions due to its inaccurate understanding of the size and intermittency of methane leaks, particularly so-called "super-emitters."

A 2018 study concluded that emission sources in the oil and gas supply chain possess a "tail-heavy distribution" caused by malfunctions and leaks, leading the Environmental Protection Agency's Greenhouse Gas Inventory (EPA GHGI) to underestimate methane emissions from the U.S. oil and gas supply chain by roughly 60% because "existing inventory methods miss emissions released during abnormal operating conditions."[6] A 2021 study supported by NASA's Jet Propulsion Laboratory found that a mere 11% of high-emitting infrastructure was responsible for roughly 29% of all methane emissions detected during the study, "potentially indicative of leaking equipment that merits repair."[7] The study also found "large, unpredictable variations" in emissions detected using sensor-equipped aircraft, demonstrating the intermittency that characterizes methane leaks, including many "super-emitting" leaks.[8] Such studies point to the critical role played by super-emitters as a driver of oil and gas sector methane emissions, as well as the need to specifically target such leaks for detection and mitigation in order to achieve widespread emission reductions. But uncertainty remains about the degree to which existing LDAR programs are being shaped by the emerging scientific understanding of leak emissions.

The Committee on Science, Space, and Technology is considering how Federal science capabilities can address methane observation and quantification gaps. Federal science agencies including the National Aeronautics and Space Administration (NASA), the National Oceanic and

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[3] United Nations Environment Programme and Climate and Clean Air Coalition (2021). Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions. Nairobi: United Nations Environment Programme. https://wedocs.unep.org/bitstream/handle/20.500.11822/35917/GMA_ES.pdf.

[4] United States Environmental Protection Agency, "Overview of Greenhouse Gases: Methane," accessed October 18, 2021, https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane.

[5] IPCC, 2021: Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf.

[6] R.A. Alvarez *et al.*, "Assessment of methane emissions from the U.S. oil and gas supply chain," *Science* (2018), https://www.science.org/doi/abs/10.1126/science.aar7204.

[7] D.H. Cusworth *et al.*, "Intermittency of Large Methane Emitters in the Permian Basin," *Environmental Science & Technology Letters* (2021), https://pubs.acs.org/doi/10.1021/acs.estlett.1c00173.

[8] Carol Rasmussen, "Study Identifies Methane 'Super-Emitters' in Largest US Oilfield," *NASA*, June 2, 2021, https://www.nasa.gov/feature/jpl/study-identifies-methane-super-emitters-in-largest-us-oilfield.

Atmospheric Administration (NOAA), the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the National Institute of Standards and Technology (NIST) support a range of modeling activities, best practices, and aerial, ground, and space-based observational programs that can help to establish a more accurate profile of methane emissions from the oil and gas sector. The Federal science enterprise also supports applied research on innovative leak detection technologies and methods. But more action and enhanced coordination among Federal agencies may be needed to develop more precise monitoring capabilities, promote the deployment of innovative LDAR technologies, and facilitate cooperation between public, private and non-profit stakeholders attempting to better understand the scale and characteristics of methane leak emissions.

To assist the Committee's evaluation of opportunities to strengthen Federal science and technology resources relating to methane leak monitoring, detection, and quantification, the Committee is requesting information from selected oil and gas companies concerning their methane leak emissions and LDAR program capabilities. A recent peer-reviewed study concluded that "the Permian Basin is likely the largest observed methane-emitting [oil and gas] basin in the United States."[9] As such, the Committee is limiting its initial information request to oil and gas operations within the Permian Basin. Based upon 2020 data compiled by the EPA's Greenhouse Gas Reporting Program (GHGRP) and the Environmental Defense Fund's PermianMAP project, Chevron Corporation's ("Chevron") operations in the Permian represented a significant source of methane emissions and possessed a high rate of detected emissions during aerial surveys.[10] The Committee is therefore submitting a series of questions and document requests to Chevron concerning its Permian LDAR programs and methane emissions resulting from leaks throughout its Permian operations. The questions and document requests are enclosed below.

Please produce two sets of the requested records in a searchable electronic format. One set should be delivered electronically to the Majority staff of the Committee, and the other set should be delivered electronically to the Minority staff of the Committee. The Committee staff can provide further guidance regarding the logistics of the record production if necessary. I request that Chevron submit its response and produce the requested information to the Committee no later than 5:00 PM on January 21, 2022.

Pursuant to Rule X of the U.S. House of Representatives, the Committee on Science, Space, and Technology possesses jurisdiction over the National Aeronautics and Space Administration (NASA), the National Institute of Standards and Technology (NIST), energy research, development, and demonstration programs within the Department of Energy (DOE), and environmental research and development programs within the National Oceanic and Atmospheric Organization (NOAA) and the Environmental Protection Agency (EPA). The

[9] Y. Zhang *et al.*, "Quantifying methane emissions from the largest oil-producing basin in the United States from space," *Science Advances* (2020), https://www.science.org/doi/10.1126/sciadv.aaz5120.

[10] United States Environmental Protection Agency, "Greenhouse Gas Reporting Program (GHGRP)," accessed October 18, 2021, https://www.epa.gov/ghgreporting; Environmental Defense Fund, "Permian Methane Analysis Project," accessed October 18, 2021, https://permianmap.org/.

Committee also possesses broad oversight authority to review and study on a continuing basis laws, programs, and Government activities relating to nonmilitary research and development.[11]

If you have any questions regarding the content of this letter, please contact Josh Schneider on the Majority staff of the Committee at 202-225-6375 or by email at Josh.Schneider@mail.house.gov.

Sincerely,

Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and Technology

CC:

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space, and Technology

[11] Rule X, Organization of Committees, U.S. House of Representatives, accessed here: https://rules.house.gov/sites/democrats.rules.house.gov/files/117-House-Rules-Clerk.pdf.

Information Request

The Committee on Science, Space, and Technology is submitting a series of questions and document requests that broadly pertain to methane leaks and Leak Detection and Repair (LDAR) programs within the oil and gas sector. The Committee defines these and other terms as follows:

- A **Methane Leak** is defined as any release of methane that results from a malfunction or an abnormal operating condition. Methane leaks encompass both unintentional [i.e., fugitive] emissions and malfunctions or abnormal operating conditions among vented sources and combustion sources. Examples of methane leaks include, but are not limited to: leaky valves; malfunctioning pneumatic controllers; and unlit flares.
- A **Leak Detection and Repair (LDAR) Program** is defined as any program or activity that is intended to: monitor, detect or repair methane leaks; or monitor, detect, quantify or mitigate emissions resulting from methane leaks, including through the implementation of operational changes.
- An **Innovative LDAR Technology** is defined as any instrument-based LDAR technique, the use of which is not currently approved for purposes of regulatory compliance under 40 CFR part 60, subpart OOOOa. Examples of innovative LDAR technologies include, but are not limited to: aerial surveys; drone-based surveys; and ground-based continuous monitoring sensors.
- **Predictive Leak Analytics** is defined as the use of data analytics to interpret LDAR data for the purposes of gaining additional insight into the characteristics of methane leaks, including the ability to predict the size and location of leaks with greater accuracy.

Unless otherwise noted, the Committee's request for information is applicable to the time period from January 1, 2016 to the present. The Committee's request for information is applicable to all Chevron operations within the Permian Basin, including all Chevron subsidiaries and affiliates. The Committee's questions and document requests are inclusive of all responsive data pertaining to Chevron operations that were generated by third parties, including but not limited to contractors and service providers, on Chevron's behalf, and that remain in the possession of or accessible to Chevron, in addition to data generated directly by Chevron. The Committee's document requests for "analyses, studies, or reports" should be construed broadly to encompass all written records of a comparable nature, form or structure.

Please provide to the Committee written answers and requested records in response to the following questions, in a searchable electronic format, no later than January 21, 2022:

1. LDAR Technologies
    a. Please provide an overview of all LDAR technologies currently being utilized as a part of Chevron's LDAR programs in the Permian.
    b. Has Chevron participated in pilot or demonstration projects of any innovative LDAR technologies in the Permian, or deployed any such technologies on a widespread scale?
        i. If yes, please describe each innovative LDAR technology; its capabilities; the scope, frequency, and methodology of its deployment; and the status of the technology's integration into the company's Permian LDAR programs.

ii. If yes, what framework does Chevron utilize to assess the performance of innovative LDAR technologies in the Permian?
iii. If yes, please provide any analyses, studies, or reports that assess the performance of any innovative LDAR technology since the technology's deployment by the company.

2. LDAR Performance
    a. What metrics does Chevron utilize to review the performance of its LDAR programs in the Permian? Please describe each performance metric. Please provide any analyses, studies, or reports that evaluate the performance or assess the effectiveness of the company's Permian LDAR programs.
    b. Does Chevron systematically analyze data from its LDAR programs to evaluate the leak vulnerability of its Permian infrastructure and direct LDAR resources more efficiently? Please describe whether and how LDAR data is utilized to improve the performance of the company's Permian LDAR activities.
    c. Does Chevron maintain records regarding the duration of methane leaks in its Permian operations, including the development of any models or estimates pertaining to leak duration? Please describe the company's methodology in evaluating methane leak duration within its operations. Please describe how data regarding methane leak duration is incorporated into company LDAR programs.

3. Innovative LDAR Technologies and Methane Emissions Mitigation
    a. Does Chevron utilize data derived from innovative LDAR technologies to mitigate its methane leak emissions in the Permian? Please specify any examples of how innovative LDAR technologies facilitated emissions mitigation in the company's Permian operations.
    b. Has Chevron attempted to estimate the total amount of methane emissions reduced through the use of innovative LDAR technologies in the Permian Basin since January 1, 2016, or on an annual basis?
        i. If yes, please explain how the company reached its estimate.
    c. Has Chevron identified any emission sources in the Permian for which innovative LDAR technologies have proven to be more effective at detecting or mitigating emissions than traditional LDAR methods?
        i. If yes, please identify the emission sources.

4. Methane Leak Emissions
    a. EPA's Greenhouse Gas Reporting Program (GHGRP) requires operators to estimate methane emissions for various sources according to prescribed methods. However, research studies have concluded that these estimates are frequently inaccurate. Has Chevron developed an alternative estimate of the company's Permian methane emissions using different methods? If so, please describe those alternative methods and explain how they differ from the methods prescribed by EPA GHGRP.
    b. Is Chevron utilizing any technologies in the Permian capable of quantifying the actual emissions that result from methane leaks?
        i. If yes, please describe each emission quantification technology, and please explain how the company has integrated each technology into its operations.

c. Has Chevron gathered data regarding the absolute amount of methane emissions caused by methane leaks across its Permian operations?
    i. If yes, please provide any analyses, studies, or reports that contain assessments, quantifications, or models of the company's absolute methane emissions caused by methane leaks in the Permian. Please include any information on the methodology used to evaluate absolute methane emissions during the preparation of these materials.
    ii. If no, please provide any analyses, studies or reports that contain a consideration of the benefits and costs of gathering additional data pertaining to absolute methane emissions caused by methane leaks.
d. How does Chevron define and calculate methane leak intensity, and what is the scope of emissions included in the calculation?
e. What was the methane leak intensity rate of Chevron's operations in the Permian on an annual basis since 2016? Please provide any analyses, studies, or reports pertaining to the leak intensity rate in the Permian during this period.

5. Intermittent, Large-Emission Methane Leaks
    a. Does Chevron maintain records that document intermittent, large-emission methane leaks within its Permian operations?
        i. If yes, please explain the company's definition of an intermittent, large-emission methane leak and how such leaks are quantified.
        ii. If yes, please provide a comprehensive list of all intermittent, large-emission methane leaks documented by the company within its Permian operations.
    b. Has Chevron assessed the contribution of intermittent, large-emission methane leaks to the company's absolute methane emissions in the Permian?
        i. If yes, please provide any analyses, studies, or reports pertaining to the quantification of intermittent, large-emission methane leaks or the impact of such leaks on the company's absolute methane emissions in the Permian.
    c. How do Chevron's LDAR programs in the Permian address the unique challenges posed by intermittent, large-emission methane leaks? Please describe any specific LDAR procedures or initiatives to reduce emissions from such leaks.

6. Predictive Leak Analytics
    a. Does Chevron utilize any type of predictive leak analytics to inform its approach to the monitoring, detection, or emission quantification of methane leaks within its Permian operations?
        i. If yes, please detail how the company incorporates data generated by predictive leak analytics into its Permian LDAR programs in order to improve its monitoring, detection, or emission quantification capabilities.
        ii. If yes, please provide any analyses, studies, or reports that utilize predictive leak analytics to assess methane emissions resulting from leaks in the company's Permian operations.
        iii. If no, please explain whether the company views predictive leak analytics as a potentially useful tool to improve the monitoring, detection, or emission quantification capabilities of its LDAR programs in the future.