



2022

methane report



Photo: Employee walking by ventilation fans near Midland, Texas, U.S.

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message from our chairman and CEO

We are pleased to issue this report, which builds on our climate change-related reporting and provides detailed information on our ongoing work to reduce methane intensity and improve methane emissions inventories. We recognize the challenges and opportunities in the evolving landscape of methane detection and measurement, including the need for reliable measurement protocols. This report highlights our efforts to advance the deployment of methane detection technology and actions to improve our performance.

At Chevron, we are focused on providing the lower carbon energy that our growing world demands. Addressing methane emissions is a key part of being a responsible producer of oil, products and natural gas.

Our goal is simple – keep methane in the pipe. To achieve this, we are using detection and direct measurement technology to improve our understanding of Chevron’s emissions. Our efforts to reduce methane emissions mean more natural gas is available to heat homes, generate power and meet the many other needs of modern society.

embracing new technology

Emissions detection technology has come a long way in the past few years. Now, with advancements in technology, we can observe and measure methane activity from an entire Upstream facility in a matter of hours. Some detection options can monitor and measure emissions around the clock. Real-time tracking of operational parameters in a control room can predict, prevent and mitigate some potential emissions. As emissions detection technologies, and in particular methane detection technologies, continue to advance, we believe these efforts can help us assess the accuracy of our emissions inventories.



taking action to reduce emissions

Chevron’s methane intensity has reduced more than 50% since 2016.¹ Our platforms in the Gulf of Mexico are some of the lowest carbon intensity producing assets in the world and designed for no continuous routine venting or flaring through features such as vapor recovery units and compressed air pneumatic controllers. Approximately 95% of Chevron’s methane emissions originate from the production of oil and natural gas.² Going forward, Chevron has made a commitment to design, where possible, all new Upstream facilities without routine methane emissions. Through our operating practices, we are taking steps to achieve our target of zero routine flaring by 2030.

building trust and delivering results, together

Our progress has been significant and we are committed to doing more. Success requires collaboration within the company, among peers and across society. The spirit of cooperation, innovation and perseverance will enable us to address our shared methane emissions reduction goals, particularly as natural gas continues to play an essential role in delivering affordable, reliable, ever-cleaner energy.

Sincerely,

A handwritten signature in blue ink that reads "Mike". The signature is fluid and cursive, written in a professional but personal style.

Michael K. Wirth

Chairman of the Board and Chief Executive Officer



lead director Q&A

with dr. wanda austin

How is the Board helping Chevron address methane?

Our Board is actively engaged on methane issues, including providing oversight of this *Methane Report*. Chevron's governance structure calls for the Board of Directors and executive leadership to exercise their oversight responsibilities with respect to potential climate change-related risks and energy transition opportunities. In 2019, the Board supported management's plan to set the first methane-intensity target for Chevron. After meeting the original target three years early, we announced lower 2028 methane-intensity targets to continue driving further reductions.

What role do you think Chevron should take in methane management?

Our role is to help develop and implement best practices and share what's working to prevent methane emissions associated with the production of oil, products and natural gas. Testing and advancing new technologies to find and fix leaks is an important contributor to global efforts to reduce methane emissions. Through partnering, we can share those ideas across our sector and influence emissions reductions beyond our own operations.

Why did the Board of Directors support a stockholder proposal seeking additional disclosure on methane emissions?

Chevron's goal is to lead in methane emissions management. We share a desire to improve accuracy and transparency in methane emissions reporting. Although Chevron does not agree with certain statements made by the proponents, there

was no need to oppose a proposal where we had fundamental alignment with the intent and approach on these issues. For a summary of our response, please see [page 23](#).

What do you find most exciting about methane technology?

Within the past 10 years, the variety and capabilities of methane detection technologies have notably advanced. Years ago, most technology was handheld. Today, satellites, drones, planes and fixed sensors have vastly improved scalability and access to methane detection and management technology. Chevron has led by testing many of these technologies and continues to invest in future advancements. Looking ahead, I am confident that the open collaboration across the business units, sectors and beyond industry is sparking innovation and bringing people together to find solutions.

about dr. austin

Chevron's lead director since 2022 and a director since 2016, Dr. Austin holds a doctorate from the University of Southern California's Viterbi School's Department of Industrial and Systems Engineering. She is a retired president and chief executive officer of The Aerospace Corporation, a leading architect for the United States' national security space programs, and also a director of Amgen Inc. and Virgin Galactic Holdings, Inc.

Photo: One of our methane drone experts, Lawrence Reed, explaining to Dr. Austin how our drone can be equipped with laser or optical imaging technology to detect and measure methane emissions.

executive summary

at chevron, we believe the future of energy is lower carbon

Chevron's strategy is clear – leverage our strengths to safely deliver lower carbon energy to a growing world. Effective methane management is important for lower carbon intensity oil and gas production.

keeping methane in the pipe

Our goal is simple – keep methane in the pipe. This starts with designing and operating facilities to prevent methane emissions and includes deploying technologies to validate performance, inform repairs and improve inventories. We aim to continue to build on our progress through technology and partnership.

Chevron has adopted an Upstream methane-intensity target of 2.0 kg CO₂e/boe by 2028, which represents a 53% reduction from our 2016 baseline. To help achieve our goals and share our lessons learned with others, Chevron supports efforts like the Global Methane Pledge and the Oil and Gas Climate Initiative's (OGCI's) Aiming for Zero Methane Emissions Initiative.

advancing detection and direct measurement

Methane emissions can have a wide range of potential causes, such as vents in older facility designs or upset conditions at a well site. We believe regular monitoring can help us detect and address infrequent super-emitters, a term used to describe sources of large emissions volumes. Through our collaboration with GHGSat, we are able to monitor 22 oil and gas production facilities from space on at least a monthly basis, weather conditions permitting.

We are working toward integrating comprehensive direct measurement into existing emission factor-based inventories as protocols are developed and technologies become more widely available to improve methane detection at both the site and source levels. Since 2016, we have tested 13 advanced methane detection and measurement technologies in an effort to find scalable

options for various asset types and geographies. Test results have also helped us assess the completeness of our methane emissions inventories. Organizations like the Oil and Gas Methane Partnership (OGMP) 2.0 provide insight on emerging methods for approaching methane quantification.

building partnerships

Chevron partners and co-funds research with governments, companies and nonindustry stakeholders to help improve our collective understanding of emissions detection technology and measurement. We also advocate for well-designed methane regulation and share what has been effective within our operations. Chevron is proud to be a founding member of The Environmental Partnership (TEP), an industry initiative aimed at accelerating the adoption of practices that help reduce methane emissions. Testing detection technology alongside universities, such as the University of Texas in Project Astra, lets us learn from and contribute to emerging solutions.

in summary

Chevron has long been committed to increasing transparency on climate-related matters. Additional transparency on methane emissions reporting is a natural extension of that commitment. Sharing innovative ideas and best practices can help others to also reduce methane emissions. Advancements in detection and measurement continue to shape our approach as we aim to improve performance and build trust among our key stakeholders and partners.

methane highlights

action plan

- > Design and operate facilities to prevent methane emissions to the greatest extent possible
- > Deploy technologies to validate performance, inform repairs and improve inventories
- > Integrate direct measurement into inventories

targets and goals

- > Pursue 2028 target of 2.0 kg CO₂e/boe for Upstream
- > End routine flaring
- > Deploy advanced detection in all Upstream operations

2021 methane emissions

Methane emissions are 4.5% of our reported global equity Scope 1 emissions.³

outcomes

> 50% reduction
in methane intensity since 2016⁴



13 advanced detection technologies trialed since 2016*

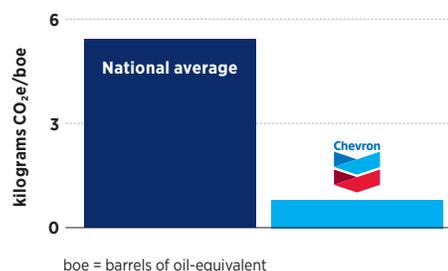


> 950 methane detection flyovers planned in the U.S. in 2022, including 100% of Permian central facilities



> 22 million components surveyed in Rockies business unit in 2020, detecting 0.01% of components leaking

U.S. upstream methane intensity



85% lower methane intensity⁵
than U.S. upstream production sector average as of 2020 for Chevron U.S. Upstream operations

*See page 9 for a full list.

methane 101

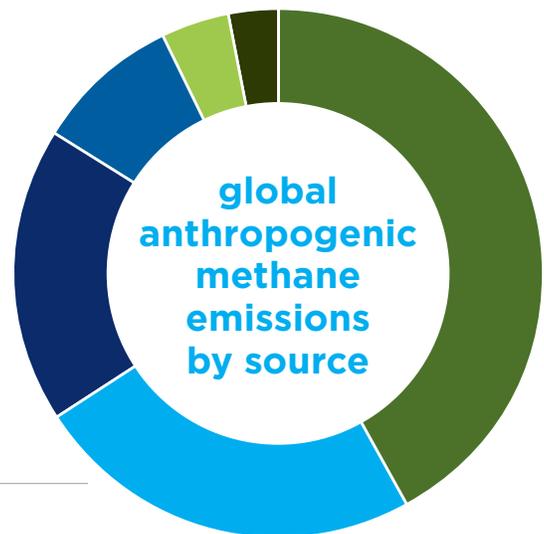
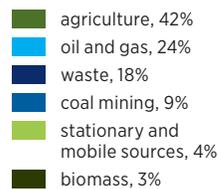


Methane is the primary component of natural gas, a source of affordable, reliable and ever-cleaner energy.

Natural gas is used to generate electricity, heat homes and cook food. In manufacturing processes, it is used to make thousands of everyday products such as fertilizer, bike helmets, hand sanitizer and diapers.

Methane is a relatively abundant and naturally occurring chemical compound. Globally, methane is the second-most common anthropogenic GHG, after CO₂ emissions. Methane exists in the atmosphere for a shorter time than CO₂ but traps approximately 25–30* times more heat over a 100-year period.

According to the U.S. EPA's Global Methane Initiative, oil and gas activities accounted for approximately 24% of the anthropogenic global methane emissions in 2020.



24%
oil and gas

*The AR4 100-year Global Warming Potential (GWP-100) assigns a GWP of 25 to convert the mass of methane to its CO₂e value. AR5, released in 2014, assigns a GWP-100 of 28. AR6, released in 2021, assumes a GWP-100 of 29.8.

methane emissions in oil and gas

Within the oil and gas sector, methane is primarily emitted from four categories of sources.

> **Vents** are direct releases to the atmosphere from equipment or processes in the natural gas value chain.

> **Fugitive emissions and equipment leaks** are unintentional sources of emissions from components such as valves, flanges, seals, piping and other equipment.

> **Flaring** can be utilized to burn excess gas to relieve pressure in upset conditions or when sending gas to sales is impossible. When flares combust natural gas, most of the methane is converted to CO₂ but, typically, 2% of methane remains uncombusted.

> **Combustion** of natural gas occurs in equipment to meet operational energy needs like electricity or heat. Some uncombusted methane will be part of the exhaust stream, but the expected amount varies with the type of combustion equipment.



improving detection to prevent methane emissions

Photo: Tanks from operations near Midland, Texas. Across the industry, practices for estimating tank emissions vary. Approaches may be based on throughput or on a complicated accounting of characteristics such as tank size, liquid volume, local environmental factors, temperature and tank shell color.

improving detection to prevent methane emissions

Chevron’s ambition is to be a global leader in methane emissions performance and we are taking action to meet that aim. Our goal is simple – keep methane in the pipe. This starts with designing and operating facilities to prevent methane emissions and includes deploying technologies to validate performance, inform repairs and improve inventories. Options to detect and measure methane emissions are advancing. Trialing emerging technology lets Chevron explore what is possible and incorporate innovative solutions into our methane management programs over time.

making the invisible, visible

Current detection technologies provide wide-ranging levels of specificity and functionality. Experimenting with a variety of advanced options helps us learn what works best for our assets and helps to validate our emissions inventories. Using operational data to interpret detection data enables us to determine the root cause of emissions. As technology improves, we expect detection information will increasingly be used to quantify emissions inventories. We are actively working on the development of methane emissions inventory frameworks and protocols that we expect will improve the transparency and consistency of reporting.

find and fix

Chevron has taken proactive steps – from the surface to the sky – to expand methane detection capabilities and identify emissions reduction opportunities. Campaigns in Argentina, the Denver-Julesburg Basin, the Gulf of Mexico, the Permian Basin and Kazakhstan tested different detection and measurement technologies. These “find and fix” campaigns involved analyzing detected emissions and making appropriate repairs. These advanced tools can help drive overall reduction in methane intensity.

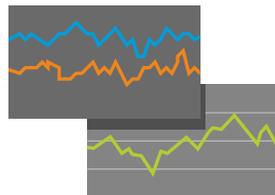
emission factors

Emission factors provide an estimate of the average emissions for an activity or piece of equipment. Combining emission factors with facility-specific information can identify the main sources of emissions resulting from the way a facility was designed.



operational information

Data such as temperature or pressure readings can help interpret detection results. We are developing algorithms to predict trends and identify when to adjust facility operating conditions to prevent emissions events.



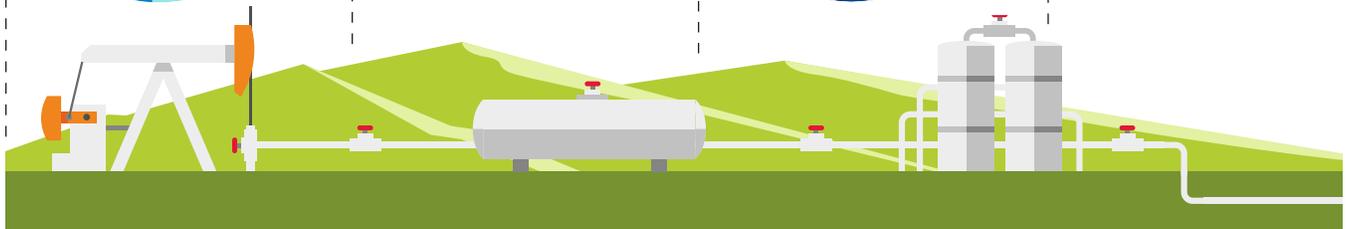
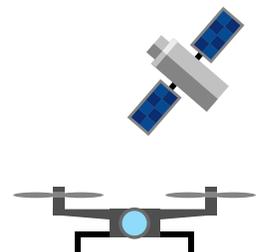
source-level measurement

Fixed metering can provide granular information about emissions rates for individual pieces of equipment, and manual methods like optical gas imaging (OGI) can help pinpoint leaks and initiate repairs. This can improve inventory accuracy, but may be challenging to scale.



site-level measurement

Facility-scale advanced technology deployed on planes, satellites or drones can provide an efficient way to detect the general location of a leak or whether a piece of equipment is missing from our emissions inventory.



methane detection technology in our operations

technology type*	capability	benefits	current challenges	example operations
 <p>satellites</p>	<ul style="list-style-type: none"> Detection thresholds range from 25,000 kg/hr to 100 kg/hr Monthly to daily global coverage 	<ul style="list-style-type: none"> Potential to be the lowest-cost option by site Helpful in identifying super-emitters 	<ul style="list-style-type: none"> Detection thresholds are high and restrict detection to very large sources Limited in producing facility-scale resolution Does not work on cloudy days Struggles with detection over water and identifying the emitter with multiple operators nearby Needs accurate local wind data for quantification 	<ul style="list-style-type: none"> Block 0/14, Angola Eastern Mediterranean, Israel El Trapijal, Argentina Gorgon and Wheatstone LNG, AU Tengizchevroil, Kazakhstan
 <p>aircraft</p>	<ul style="list-style-type: none"> Detection thresholds range from 50 kg/hr to less than 3 kg/hr Scale of hundreds of sites per day 	<ul style="list-style-type: none"> Leading service providers can likely capture most facility emissions 	<ul style="list-style-type: none"> Not all technologies provide specific source or emission size information, meaning additional detection is needed to identify the source 	<ul style="list-style-type: none"> Denver-Julesburg Basin, U.S. Permian Basin, U.S. Vaca Muerta, Argentina Gulf of Mexico, U.S.
 <p>facility-scale periodic monitoring (drone or mobile lab)</p>	<ul style="list-style-type: none"> Detection limits of less than 1 kg/hr are possible with the right wind conditions and site access Scale of tens of sites per day in onshore applications 	<ul style="list-style-type: none"> Ability to scan an entire site, including areas that would otherwise be difficult to reach with handheld devices 	<ul style="list-style-type: none"> Field application requires individual site visits and travel time between sites or platforms Challenges near electrical power lines and near airports for drones Weight of the emissions sensors can reduce battery life and limit flight time for drones 	<ul style="list-style-type: none"> Denver-Julesburg Basin, U.S. Gulf of Mexico, U.S. Permian Basin, U.S. Block 0/14, Angola Gorgon and Wheatstone LNG, AU
 <p>facility-scale near-continuous monitoring (fixed cameras, sensors, etc.)</p>	<ul style="list-style-type: none"> Detection limits vary with the sensor placement and wind conditions and range from 25 kg/hr to less than 1 kg/hr Equipment is fixed at one site or location 	<ul style="list-style-type: none"> Potential for 24/7 site coverage Could have uses beyond methane detection May provide information on the duration of intermittent sources 	<ul style="list-style-type: none"> Research and development is needed to scale this approach Generally need precise wind data to interpret detection results 	<ul style="list-style-type: none"> Denver-Julesburg Basin, U.S. Permian Basin, U.S. Tengizchevroil, Kazakhstan
 <p>manual leak detection (handheld screening like OGI and EPA Method 21)</p>	<ul style="list-style-type: none"> Detection limits vary based on environmental and human factors but are generally characterized at less than 1 kg/hr Scale of a few sites per day 	<ul style="list-style-type: none"> Ability to identify exact location of a source of emissions Third-party services available in locations with regulatory programs Potential to incorporate into emissions reporting for fugitive components Current industry and regulatory approach 	<ul style="list-style-type: none"> Labor intensive Travel time between sites Human and site factors impact results Does not quantify emissions Can be difficult to reach elevated sources with handheld detection tools 	<ul style="list-style-type: none"> Block 0/14, Angola Denver-Julesburg Basin, U.S. Eastern Mediterranean, Israel Gorgon and Wheatstone LNG, AU Gulf of Mexico, U.S. Permian Basin, U.S. San Joaquin Valley, U.S. Tengizchevroil, Kazakhstan El Trapijal, Argentina

- commercial use
- completed or ongoing pilot
- planning stages

*Since 2016, Chevron has trialed 13 advanced methane detection technologies. Trials have included multiple projects with six continuous monitoring devices: Project Canary (Canary X), Scientific Aviation SOOFIE[®], Honeywell Gas Cloud Imaging (GCI and Mini GCI), Aeris MIRA Ultra Mobile LDS and Quanta3. Trials have also involved four aerial survey vendors, Bridger Photonics, Kairos Aerospace, NASA JPL (AVIRIS-NG) and GHGSat; two drone-based solutions from SeekOps and DJI; and a satellite provider, GHGSat.
AU = Australia

learning by doing

Chevron is trialing emerging technology and actively collaborating to find better ways to detect and measure methane emissions. These efforts allow us to learn more about our methane emissions while vendors obtain real-world experience to refine their technology and methods. Chevron is deploying the most promising solutions.

Assessing technology in the Permian Basin

Our trials have shown that the success of certain technologies is tied to the unique characteristics of the assets and geography where the solution is deployed. We trialed eight options using the following technology evaluation framework and selected an aerial light detection and ranging (lidar) vendor, Bridger Photonics, for wider deployment.

- **Leak location specificity:** Technologies provide varying levels of location specificity for methane emission sources, from the several-kilometer scale down to the component level. Solutions like aerial lidar that can identify pieces of equipment for follow-up were found to be more useful than approaches with only site-level information.
- **Data delivery timeline:** Having timely data available can improve follow-up activities. The utility of screening data decreases as more time passes after initial detection. Aerial lidar results are typically available within a few days, while some trialed technologies took up to a few months to deliver data.
- **Vehicle traffic:** Road safety is a priority for Chevron. Using aircraft reduces vehicle traffic compared to other solutions that require driving to sites.
- **Cost sharing and scalability:** Technology approaches that can be used across multiple operators tend to be most cost-efficient at scale. Aircraft-based monitoring can group flights with nearby operators that have their own aerial detection programs.

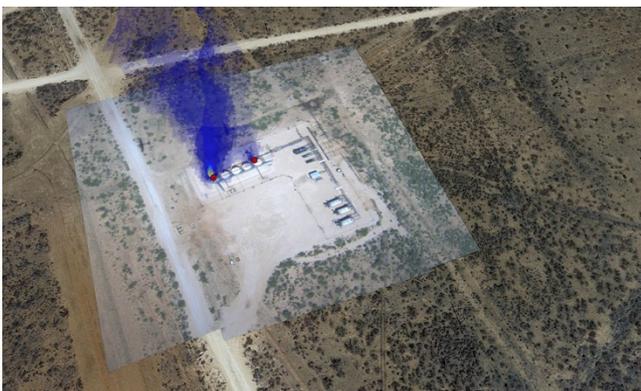
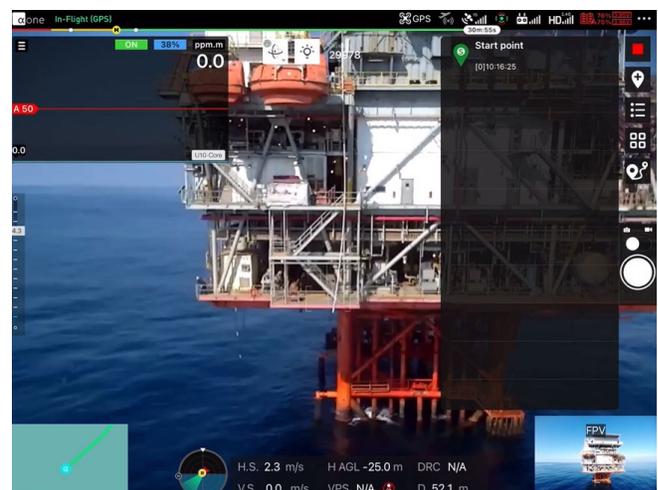


Photo: Methane emissions detected in June 2021 using Bridger Photonics aerial lidar technology at a remote centralized production facility tank battery in the Permian Basin. Color added for effect. An October 2021 follow-up flyover detected no emissions after facility repairs were made.

- **Methane detection limits:** Methane detection solutions for the oil and gas industry have limits that vary from several thousand to less than 1 kg/hr. Solutions like aerial lidar with detection limits of less than 10 kg/hr have been most useful in our Permian Basin operations.
- **Resiliency to local weather conditions:** Technologies deployed at scale need to function effectively and accurately in all weather conditions.

Gulf of Mexico drone pilot

Our Gulf of Mexico business unit was one of the first operators to deploy an offshore detection solution using drones. Offshore emissions detection is challenging because ocean water can confuse some detection technologies and create false readings. In addition, platforms have layered, dense equipment, which can complicate the ability for drones and aircraft to identify emission sources as they fly above a facility.



Photos: Drone pilots using laser and OGI technology to conduct a methane emissions inspection of a Chevron platform in the Gulf of Mexico.

To overcome these obstacles, we combined onshore emissions detection equipment with offshore drones and developed a new flight procedure to detect methane emissions from each level of a platform. A survey at one platform revealed a small, uncatalogued source that was subsequently added to the methane emissions inventory.

Expanding satellite monitoring

Satellite-based monitoring is best suited for isolated, onshore assets with low cloud cover. In a pilot with GHGSat, we used a location that matched these criteria and had a known emission source (a storage tank with emissions reduction efforts underway) with an estimated emissions rate near the lower end of the GHGSat satellite's detection threshold. The pilot was able to detect the source and confirm the satellite's capability. In 2022, Chevron contracted GHGSat to monitor up to 22 onshore assets worldwide. A pilot to test GHGSat technology in offshore environments is also underway.

Collaborating to improve continuous monitoring technology

Chevron joined Project Falcon, a joint-industry partner study led by Scientific Aviation that aims to determine the best way to deploy continuous methane monitoring technology at the facility level. The goal is to help companies find, detect and repair methane leaks faster. Chevron provided a test site to explore using supervisory control and data acquisition observations to reveal underlying operational issues and lead to more accurate interpretation of emissions findings.

Chevron also participates in Project Astra, led by the University of Texas at Austin, which is establishing a methane

sensor network that leverages data sharing and analytics to provide near-continuous monitoring across oil and gas facilities in the Permian Basin. This work includes a methane sensor inter-comparison, the development of a digital twin of the pilot region and a concept demonstration in a roughly 100 km² pilot region. We expect to learn about the potential for a regional mesh network, which could facilitate shared methane management activities in regions with multiple operators.

building partnerships

Advancing our efforts in methane detection, direct measurement and quantification requires collaboration with multiple stakeholders. Chevron partners and co-funds research with governments, companies and nonindustry stakeholders to help improve the understanding of emissions detection technology and measurement. Sharing innovative ideas and best practices can help others reduce methane emissions and lead to wider adoption of technologies.

We are collaborating globally to help advance a lower carbon future. In Kazakhstan, we are sharing our experience and practices by partnering with KazMunayGas (KMG) to evaluate the potential for joint lower carbon projects, including methane management. Chevron is proud to support the development of the country's energy sector and believes that we can play an important role in the country's energy transition and achievement of its carbon reduction targets.

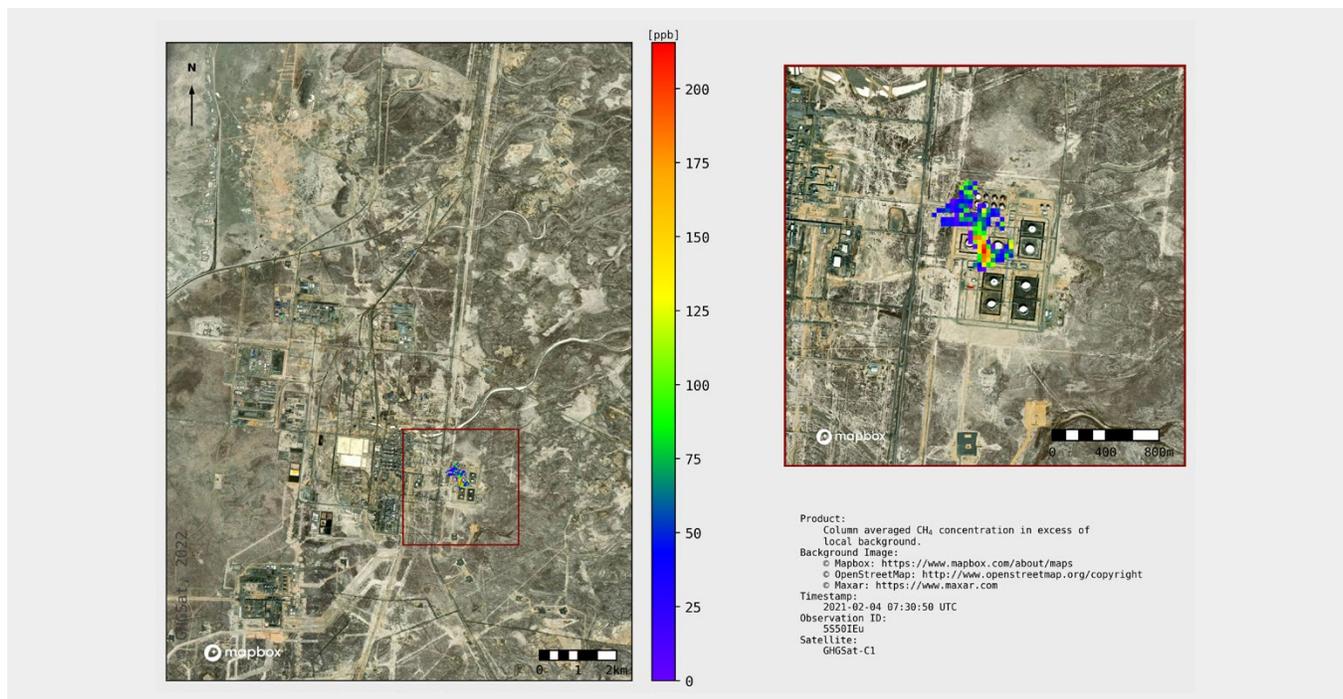


Photo: Methane emissions from a storage tank detected by a GHGSat satellite in February 2021. An emissions reduction effort was already underway for the tank.

‘KazMunayGas has set a goal to reduce its carbon footprint by 15% by 2031 compared to 2019 levels. Lower carbon is a new area for us, and we believe that Chevron’s wide experience in implementing lower carbon technologies and practices in the oil and gas industry will contribute to our capabilities and lead to joint lower carbon projects.’

– magzum mirzagaliyev, chairman of the management board of KMG

Chevron has conducted outreach with stakeholders in a variety of locations. Examples include:

- **Ipieca Methane Virtual Workshop:** We shared our experience with the development and use of methane metrics to encourage wider adoption across the industry.
- **OGCI:** The OGCI member companies, including Chevron, have a methane-intensity target to help reduce collective average upstream methane intensity to well below 0.20% as a share of marketed gas by 2025. As of 2020, member companies’ collective methane intensity was 0.20%.⁶ In 2021, the OGCI began funding a satellite-based methane monitoring pilot with GHGSat for the oil and gas industry in Iraq and is working to expand to other countries as an introduction to methane monitoring services.
- **The World Bank’s Global Gas Flaring Reduction Partnership:** The partnership is collaborating with the OGCI and researchers at the Colorado School of Mines to develop a transparent web platform for real-time mapping and tracking of global gas flaring data. The platform is expected to provide information about the characteristics of flaring globally and flare abatement options available to operators. Chevron supports this work through our membership in the OGCI.

Academic research

Academic research can help improve the understanding of emissions and is a typical route for developing new emission factors for inventory quantification. Below are a few examples of our contributions to methane-related academic research:

- **Collaboratory to Advance Methane Science (CAMS):** Chevron is a founding member of CAMS, a joint-industry project to conduct peer-reviewed research around methane emissions. Our recent CAMS projects include an aerial survey in the Permian Basin, a review of satellite monitoring capabilities, and a measurement study of emissions from LNG transport activities.
- **Fayetteville Methane Reconciliation Study:** As a sponsor, Chevron contributed to funding this multimillion-dollar public-private research project addressing the persistent gap between top-down and bottom-up methane estimates. Researchers took concurrent emissions measurements at multiple scales using activity data from participating operators. From this,



Vanessa Ryan
Methane Reduction Manager,
Chevron Strategy
and Sustainability

employee spotlight

Effective partnerships can help our sector collectively work to answer complex questions around methane emissions. In addition, collaboration allows us to pool resources, which can make execution of detection campaigns and field trials more time efficient and cost-effective. One partnership I am proud to be involved in is The Environmental Partnership.

The Environmental Partnership companies come to the table because they want to learn about and improve how they address methane emissions. And they also come ready to share. Every company that joins The Partnership is at a different place in their journey, from those just learning about the basics to those that are very sophisticated in their methane emissions reduction strategies. But we all work to reduce our environmental footprints and continue to provide affordable, reliable and ever-cleaner energy.

we helped establish an industry best practice around liquid unloading operations and learned about the temporal variability of emissions from maintenance during daytime hours.

- **Methane Emissions Technology and Evaluation Center (METEC):** A facility at Colorado State University that provides realistic oil field settings to test new methane detection technologies. METEC has developed protocols for controlled-release testing, which has helped technology providers refine their products at an early stage and provided industry with independent performance information. METEC has also developed a two-day, hands-on training course for optical gas imaging. METEC was originally funded by the U.S. DOE but is now supported by an industry advisory board that includes Chevron.



reducing methane intensity

Photo: Employees and contractors in the control room can monitor well conditions and notify operations staff to investigate upset conditions.

reducing methane intensity

A proactive strategy to design and operate facilities can lead to meaningful reductions in methane intensity. We are evolving facility designs, enhancing operating practices and deploying advanced methane emissions detection technology. Detection and measurement can assess whether controls are functioning as designed or identify leaks and other areas for improvement.

setting methane targets

Chevron has set an Upstream methane-intensity target of 2.0 kg CO₂e/boe by 2028, which represents a 53% reduction from our 2016 baseline. We track progress against our targets using current best available emissions inventories, which primarily rely on emission factors to estimate methane emissions. We are working toward establishing measurement-informed inventories while at the same time making meaningful progress by executing emissions reduction projects.

Other entities express methane-intensity metrics in different units. For example, the OGCI has a 2025 collective methane-intensity target of well below 0.2% of marketed gas from operated assets. Chevron's 2.0 kg CO₂e/boe target is equivalent to 0.18% of marketed gas production, which is consistent with the OGCI collective target. Our target is calculated on an equity basis and includes our percentage ownership interest in emissions from nonoperated joint

ventures (NOJVs). In 2021, our Upstream methane-intensity performance was estimated at 0.15% of marketed gas production from operated assets and 0.19% of marketed gas production on an equity basis.



to create customized charts and tables using our performance data, visit:

chevron.com/sustainability/performance/chart-generator

common goal

In March 2022, the OGCI launched the [Aiming for Zero Methane Emissions Initiative](#).

Chevron is a signatory to the initiative and welcomes the call for the oil and gas industry to focus on methane emissions reduction, reporting and technology deployment. The initiative is an important way to improve methane management and to work toward a common goal of near-zero methane emissions performance by the end of the decade.

Equity-based methane targets and NOJVs

As noted earlier, Chevron's carbon- and methane-intensity targets are set on an equity basis, meaning that the emissions performance of both operated and NOJV assets are included in our reporting. We believe that building constructive partnerships and sharing access to our expert resources are the best ways that we can positively influence methane emissions performance at nonoperated assets.

To learn more about emissions reduction and to share our expertise, we facilitate GHG reduction opportunity identification workshops at both operated and nonoperated assets. In 2021, Chevron facilitated a workshop for Angola LNG that included subject matter experts from all shareholders (Sonangol, Chevron, BP, Eni and TotalEnergies) and generated several opportunities, including flare reduction, methane emissions reduction and energy efficiency projects.

methane emissions reduction efforts

To evolve facility designs, process controls and systems are being re-engineered to help remove, reduce or prevent methane venting as part of normal operations. In 2022, we made a commitment to design, where possible, new Upstream facilities without routine methane emissions. Based on our experience, we anticipate that many detected emissions will be addressed through changes in operating practices. These changes are expected to impact how facilities are run and maintenance and reliability decisions are made.

actions designed to lower the methane intensity of our operations

facility design

- Replace continuous high-bleed pneumatic controllers and move toward non-emitting options
- Move to dry seals and add emissions controls to wet seals on centrifugal compressors
- Install emissions controls on venting points on dehydrators
- Develop casinghead gas collection systems for higher gas-to-oil ratio fields
- Install emissions controls for flashing, breathing and working losses on hydrocarbon storage tanks

operating practices

- Take steps to achieve our target of zero routine flaring by 2030, reduce nonroutine flaring and reduce venting
- Change out rod-packing equipment parts on reciprocating compressors
- Incorporate reduced emissions completion techniques on all hydraulically fractured wells
- Use emissions reduction techniques to capture or reduce vented volumes during pipeline blowdowns
- Reduce venting by using non-emitting unloading methods and keeping an operator onsite during manual liquid unloading events at gas wells

advanced technology

- Conduct recurring instrumented leak detection and repair surveys
- Utilize commercial methane detection technologies and partner to develop new approaches
- Validate methane emissions performance and work to improve inventories
- Work toward field-based methane reporting as detection and measurement technology improves

the global methane pledge

Since the Global Methane Pledge launched in November 2021, more than 100 countries have joined the effort to reduce global human-made methane emissions by at least 30% from 2020 levels by 2030. We support the pledge through participation in the Methane Guiding Principles initiative to develop a methane policy toolkit for countries that have committed to the Global Methane Pledge.

Carbon reduction program

Chevron prioritizes methane emissions reduction projects for funding through our established carbon reduction program, which uses marginal abatement cost curves to inform our priorities and resource allocation. Opportunities to reduce methane emissions are identified and projects are evaluated for the ability to implement. As part of our program, in 2022 we are taking actions to advance many projects designed to reduce methane emissions.

Facility design improvements in Colorado

A carbon intensity review of our Rockies business unit (RBU) identified its largest source of methane emissions as pneumatic controllers. This year, RBU plans to convert approximately 4,400 controllers to compressed air from produced natural gas. Air compression systems will be installed to drive most of the converted controllers, with electric and solar-powered systems installed in some instances. These modifications are expected to reduce RBU's pneumatic-related methane emissions by 75% from 2021 levels, enhancing existing low methane intensity designs, including tankless production facilities.

Data-driven emissions reductions in Angola

In early 2022, our Angola assets began using an interactive dashboard that displays fuel, venting and flaring data that can be accessed from computers or smart devices. This enables operations, field personnel and management to share, analyze and act on the readings. Actual emissions data are tracked against expected emissions. Differences identify opportunities for further investigation to determine where operational enhancements, equipment adjustments or repairs may be needed, all of which can improve methane emissions performance.

‘As director of The Environmental Partnership, I am proud of the program’s growth and the oil and natural gas industry’s commitment to continuous improvement of environmental performance. As a founding member, Chevron demonstrates this commitment by taking a leading role to advance new and proven technologies, share their expertise and experience, and identify and implement best practices to drive down methane emissions across the supply chain. Together, we can help meet industrywide objectives to reduce emissions while still meeting society’s growing energy needs.’

- matthew todd, director, the environmental partnership

Flaring and venting prevention in the Permian

In the Permian, we have deployed real-time autonomous optimizers (RAOs) that continuously monitor facilities and well conditions to help prevent flaring, venting and well shutdowns. A RAO throttles back production when it detects upset conditions and resumes production when conditions allow. It also signals to a control room dashboard that prompts field teams to investigate and resolve issues. A 2020–2021 pilot of the RAO technology showed an 80% decrease in flaring and venting upset volumes at sites and a 40% reduction in well shutdowns. After the pilot, we worked to scale the RAO technology across our unconventional assets in the Permian.

the environmental partnership

Chevron is a founding partner of TEP,
an industry initiative aimed at
accelerating the adoption of practices
that reduce methane emissions.

Companies in this initiative have
conducted more than 1.2 million leak
detection surveys and replaced more than
51,000 pneumatic controllers with
lower- or non-emitting technologies.



Morgan Iannuzzi
Air Team Lead
Mid-Continent business unit

employee spotlight

As a colorless, odorless gas, methane takes different tools and techniques to find. In the Permian, we have tested eight technologies and have increasingly used an aerial light detection and ranging vendor due to a combination of detection limits, plume location information and imaging capabilities, screening speed, and results turnaround time.

Recent surveys across the Permian indicated higher-than-expected emissions at some compressors. A working group was formed comprising Chevron, other basin operators in The Environmental Partnership (TEP), and compressor companies to investigate the emissions and identify mitigation options. The group agreed on a protocol for conducting a study, which included a variety of measurement and detection techniques to identify precise points of leakage (e.g., valves or exhaust stacks).

TEP workshops are an excellent venue for learning how others in the partnership manage common challenges. When a peer presented the benefits of Vapor Recovery Towers (VRT), we recognized a carbon reduction opportunity and have installed three VRTs to date. VRTs act as an additional separation step to eliminate tank venting and flaring for Midland Basin compressor stations.

Collaboration and information sharing to continuously improve industry performance is a tenet of TEP and a reason why Chevron is a founding member.

permian basin

Through our legacy companies, Chevron has been active in the Permian Basin since the 1920s and is currently one of the largest producers of oil and gas in the region. In the Permian Basin, we can see Chevron's approach to methane management in action.

leading methane intensity performance in the permian basin

<p>action area: facility designs</p>	<p>Standard designs for tank batteries and compressor stations include vapor recovery units (VRUs), which gather gases to be reused or sold rather than emitted.</p> <p>Since 2011, standard facility designs have included compressed air for pneumatic controllers, which eliminates natural gas venting for that application.</p> <p>We are partnering across the industry to study higher-than-expected emissions from some compressors in the Permian Basin.</p>
<p>action area: operating practices</p>	<p>real-time autonomous optimizers</p> <p>RAO technology continuously monitors facilities and well conditions to help prevent flaring, venting and well shutdowns. It can throttle back production when it detects upset conditions and resume production when conditions are optimal. Learn more about RAOs here.</p>  <p>vapor recovery unit reliability program</p> <p>This program monitors for high pressure at VRUs across most of our Permian assets, can alert the control room to dispatch an operator to assess equipment experiencing continuous high-pressure conditions, and includes monthly reports identifying specific equipment for maintenance.</p>  <p>flare reduction program</p> <p>Escalation processes for unplanned flaring events enable decision making at the right level. An individual with the appropriate resources and authority can do what is necessary to reduce flaring, such as authorize overtime, expedite parts, move crews around or ultimately decide to shut in production.</p> 
<p>action area: advanced technology</p>	<p>We have piloted eight advanced methane detection solutions and selected an aerial laser-based methane scanning technology for broader deployment in the Permian. Aircraft-based solutions help us and nearby operators cost-effectively screen assets for methane emissions across a wide geographic footprint in the Permian. Learn about our framework for selecting technology here.</p> 



advancing methane measurement

Photo: Most methane detection technology requires secondary follow-up to determine the root cause of any leak.

advancing methane measurement

Our approach to improving methane emissions reporting is driven by our desire to make the invisible, visible. We are taking actions that we believe will provide information to help enable further emissions reductions and improve the quality and transparency of our methane emissions disclosures.

how methane measurement works

In oil and gas operations, the sources of methane emissions are dispersed, unlike those of CO₂ emissions, which tend to concentrate at single points. Technologies that quantify methane emissions rarely take measurements at the actual source of emissions. Instead, most quantitative approaches take short, snapshot measurements of atmospheric concentration at specific points above or downwind of a facility or group of facilities. An emissions rate is then inferred using a model that accounts for wind speed and direction, background concentration and plume shape, which are typically estimated and not measured. This approach has inherent uncertainty based on the measurement device, the meteorological modeling and the representativeness of the measurement at that point in time compared to annual emissions.

emission factor-based inventories

Emission factors help build estimated methane emissions inventories when measuring large numbers of sources may not be possible. In this methodology, an activity or equipment count (e.g., number of pneumatic controllers) is multiplied by an emission factor for a particular source or activity (e.g., emissions per controller). These factors are developed based on research, engineering designs and field studies. For example, the U.S. EPA Greenhouse Gas Reporting Program provides factors to estimate equipment leak emissions from oil and gas wellheads that are based on previous field measurement studies. These field campaigns have made visible the effort required to directly measure dispersed emission sources with quantitative equipment. To put the scale of effort into perspective, there were approximately 937,000 producing wells, 480,000 separators and 1.8 million methane-emitting pneumatic controllers in the United States in 2020.⁷

Using emission factors in our inventories

Chevron uses emission factors consistent with regulatory reporting requirements in jurisdictions like the United States. We also use industry reporting guidelines like the American Petroleum Institute *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry* (2009). We recognize that these factors are not intended to quantify methane emissions from specific operations at any one site at any one point in time but rather establish estimates of common sources across large sample sizes. We anticipate a diminishing role for emission factors with greater integration of methane measurements in emissions inventories over time.

Building robust inventories in Latin America

In 2021 in Argentina, we joined our first multi-operator flyover methane detection campaign outside North America. The goal was to test the capability of an emerging technology and compare results to existing inventories. The aerial imaging survey covered 100+ square miles. As a result, our business unit has updated procedures to detect and mitigate unlit flares and is pursuing other innovative asset monitoring.

direct measurements for existing methane emissions inventories

We are working to incorporate field measurement data into existing emission factor-based inventories as quantitative technologies become more widely available and protocols are developed to reconcile current inventories with actual measurements. Collaboration with industry, academic and environmental organizations to improve the technology and protocols for direct measurement of methane is ongoing. We are investing resources and partnering to resolve challenges such as modeling wind conditions and plumes, accounting for changing site conditions over time, and obtaining timely data, all of which can impact the reliability of emissions calculations based on direct measurement.

Working toward measurement-based reporting

Several initiatives, including OGMP 2.0, are aimed at developing measurement-based reporting in the oil and gas sector. Chevron's strategy focuses more on preventing methane emissions and using advanced detection technologies in the near term to provide a holistic view of asset-level methane emissions, particularly for larger sources of emissions. We believe this approach can scale quickly across a global asset base, provide actionable information for methane emissions reduction and augment emissions reporting as protocols become available.



Currently there are no commonly accepted standard protocols to incorporate direct measurement into the quantification of emission factor-based inventories.

Developing technical protocols

To help advance protocols, Chevron joined Veritas, the GTI Energy Differentiated Gas Measurement and Verification Initiative. The goal of Veritas is to develop technical protocols for measurement, audit and assurance and provide a widely accepted methodology to incorporate field-informed methane quantification into emissions inventories. The protocols are being developed with technical experts, leading academics, environmental nongovernmental organizations and industry peers. In summer 2022, Chevron tested and provided technical feedback on the protocols. Successful adoption of these types of protocols would help create consistent and transparent methodologies for companies to calculate and report methane emissions.

Validating emissions inventories in Colorado

Working with academics and state regulators in 2021, we participated in Colorado State University's Colorado Coordinated Campaign, which combined ground and aerial detection solutions to build an emissions model for the Denver-Julesburg Basin. The project used the NASA Jet Propulsion Laboratory's airborne imaging tool, along with advanced emissions inventory software, to model variations in methane emissions across space and time. The goal was to understand how well current emissions estimates reflect measured emissions and to assist in validating emissions models that can be used for Colorado regulation.



Adam Pacsi
Methane Policy
and Partnerships Advisor,
Chevron Strategy and
Sustainability

employee spotlight

I have had the opportunity to work on different aspects of methane management, from direct measurement studies as a graduate student to designing methane emissions reduction strategies at Chevron. Recent technology advances stemming from focused research and development activities have provided a pathway to scaled methane monitoring, which is a critical step toward improved methane management and inventory development.

There is a valid critique that emission factor-based inventories may fail to account for higher-emissions events, sometimes called "super-emitters" or "fat-tail sources." At the same time, emission factor-based inventories provide a tool for understanding methane emissions resulting from how facilities are designed and which methane control technology options are in place. I am proud that Chevron is using the best available information to develop methane emissions reduction projects while working to deploy advanced technologies to identify opportunities to further reduce emissions, particularly from these low-frequency, high-emitting events.

Methane emissions are a global challenge. Meeting methane reduction goals for companies and society will require technologies that can scale to thousands or millions of sites. I am excited to be working at the forefront of this important issue.

methane emissions as part of Chevron's voluntary disclosures

Chevron's initial deployment of direct measurement technologies in several of our operations has generally found reported emissions volumes to be within expected ranges.⁸ Given the current state of measurement protocols and methane detection capability, Chevron does not believe it is practicable at this time to assess with a high degree of certainty the differences between inventories developed using emission factor-based approaches and those based on direct measurement.

We believe that deployment of advanced detection technologies and efforts to identify missing emissions in our inventories can help reduce methane emissions and inventory estimation uncertainty.

‘Quantum Energy Partners’ Innovation Fund has invested in Project Canary to support company growth and advance the transparency and reliability of methane data. Their continuous monitoring technology accurately detects emissions in real time, and we appreciate Chevron’s participation in piloting the facility-level, methane-focused sensors. This technology can help companies like Chevron verify whether emissions controls are operating as designed and preventing methane emissions from occurring. Separately, Chevron’s achievement in Project Canary’s independent analysis and TrustWell™ certification should not go unnoticed. Setting a high bar is what leaders serious about net zero emissions do.’

– keila hand, managing director and head of ESG, quantum energy partners

We believe improvement and scalability of direct measurement technologies, coupled with development of protocols to incorporate direct measurement information into inventory quantification, will increase stakeholder confidence in methane emissions reporting. We are actively working on technology and partnerships in this area.

Our GHG inventory estimates that methane emissions are 4.5% of our global equity Scope 1 emissions. We have assessed the potential impact to our emissions inventory if actual methane emissions hypothetically were to be 50% and 100% higher than currently reported volumes. Under these assumptions, our overall Scope 1 emissions in 2021 would have increased by 2.2% and 4.5%, respectively.*



for our most recent assurance, visit:

chevron.com/GHGassurance

third-party assurance on methane reporting

For more than 10 years, an independent third-party assurance of Chevron’s GHG emissions has been conducted. This verification includes methane emissions and was expanded in 2021 to include Chevron’s GHG intensity performance data, Scope 3 emissions and GHG emissions on an operational control basis. [Chevron’s annual third-party assurance of GHG emissions](#) includes Scope 1, Scope 2 and Scope 3’s Category 11 “Use of Sold Products” on both an equity share and operated basis for Chevron’s global operations. The objective is to assess whether the assured emissions data are reported in accordance with the principles of completeness, comparability across the organization and accuracy, including calculations, variances since the last reporting period, use of appropriate conversion factors, and consolidation.

Certified natural gas

Chevron is evaluating multiple third-party certification programs that can help enable us to market certified natural gas volumes to customers. In early 2022, we entered a pilot with Project Canary to use its comprehensive TrustWell™ certification program to review and analyze the environmental and social performance aspects of wells and facilities in Colorado and Texas. Of the 85 wells analyzed, 82 achieved “Platinum” status and three received “Gold” status, Project Canary’s highest ratings.

*See citation 1 for source link. For 2021, Chevron reported equity Scope 1 emissions of 57 million tonnes CO₂e, of which 2.5 million tonnes CO₂e were methane. We calculated the hypothetical impact of a 50% increase in reported methane emissions (1.25 million tonnes CO₂e) and a 100% increase in reported methane emissions (2.5 million tonnes CO₂e) as an increase to the 57 million tonnes CO₂e from global equity Scope 1 emissions. The hypothetical GHG emission additions would represent 2.2% and 4.5% increases, respectively, in overall equity GHG emissions.

participating in methane policy

Chevron believes that methane management is critical to a lower carbon future and that methane reductions are possible in the energy industry, and in other key sectors, through adoption of industry best practices, advancement in measurement technologies, carbon pricing and methane regulations.

We support carbon pricing as the primary tool to most efficiently and effectively enable GHG emissions reductions, including methane. However, carbon pricing requires robust measurement, reporting and verification (MRV) programs to accurately quantify emissions, and continued advances in methane measurement technologies and protocols are needed. In jurisdictions where MRV programs for methane are not robust and mature, we continue to engage on and support effective methane regulations as the transitional policy approach.

Chevron supports:

- **MRV programs:** Methodologies need detection technology performance specifications, measurement protocols and verification to ensure consistent quantification and reporting of methane emissions across all covered operators and sectors. Currently, there is greater measurement uncertainty with methane emissions than with CO₂ emissions. A robust MRV framework will need emission factors, engineering estimates and the use of advanced technologies.
- **Technological innovation:** Policy should flexibly incorporate advanced technologies, such as aerial and drone monitoring, that can detect and measure methane emissions most effectively, particularly from super-emitters that have a disproportionate impact on overall emissions. Policy frameworks should be based on realistic current capabilities of measurement technologies.
- **All sectors contributing:** Improving methane performance is important for oil and natural gas (24% of global methane emissions), as well as other sectors, which make up the remaining 76%. Policy should apply to all key sectors.
- **Performance-based regulation:** When jurisdictions pursue effective methane regulations, they should set appropriate methane targets based on industry best practices, including reasonable minimum equipment standards, while providing flexibility for companies to determine the optimal way to meet those targets.

Chevron has actively engaged with the New Mexico Environment Department, Colorado Department of Public Health and Environment, and other entities for knowledge sharing on methane. We have also provided policy feedback to Nigeria's Ministry of Petroleum Resources and Kazakhstan's Ministry of Ecology, Geology and Natural Resources.



Al Williams
Vice President, Corporate Affairs

We believe learning from and sharing best practices within the oil and gas industry can help improve industrywide methane management. We share our experiences on what has been effective within our operations and are committed to engaging in the public policy process.

Additional examples of engagement include:

- **U.S. Environmental Protection Agency Methane Detection Technology Workshop:** Our subject matter experts shared our experiences with traditional and emerging methane detection technology approaches and views on the way advanced technologies could more easily be integrated into regulatory programs.
- **U.S. House Committee on Science, Space and Technology:** Chevron provided information on methane detection trials in the Permian and our approach to methane management in the region.
- **International Energy Agency Workshop:** We shared our methane management experience and discussed how industry and regulators can encourage methane reductions.

To view our public statements and comment letters, go to [chevron.com/newsroom/media/publications](https://www.chevron.com/newsroom/media/publications).

2022 stockholder proposal on methane

In 2022, Chevron received a stockholder proposal to report on the reliability of methane emissions disclosures. We have provided highlights from this report that align with each item in the resolution. We look forward to sharing further progress on how to advance the accuracy and credibility of methane emissions reporting.

Summarize the outcome of any efforts to directly measure methane emissions by the Company

➤ Since 2016, we have tested 13 advanced methane detection and measurement technologies in an effort to find scalable options for various asset types and geographies. Test results have also helped us assess the completeness of our methane emissions inventories. In addition, we are working toward integrating field measurement data into existing emission factor-based inventories as protocols are developed to reconcile current inventories with actual measurements and technologies become more widely available to improve methane detection at both the site and source levels. Currently there are no commonly accepted standard protocols to incorporate direct measurement into the quantification of emission factor-based inventories. To help advance protocols, Chevron joined Veritas, the GTI Energy Differentiated Gas Measurement and Verification Initiative. We also continue to learn from organizations like the OGMP 2.0 who provide insight on emerging methods for approaching methane quantification. On the policy front, we support carbon pricing as the primary tool to most efficiently and effectively enable GHG emissions reductions, including methane.

Provide investors with insight as to whether there is likely to be a material difference between direct measurement results and the Company's published estimates of methane emissions

➤ Chevron's initial deployment of direct measurement technologies in several of our operations has generally found reported emissions volumes to be within expected ranges. Given the current state of measurement protocols and methane detection capability, Chevron does not believe it practicable at this time to assess with a high degree of certainty the differences between inventories developed using emission factor-based approaches and those based on direct measurement. We believe that deployment of advanced detection technologies and efforts to identify missing emissions in our inventories can help reduce methane emissions and inventory estimation uncertainty. We believe improvement and scalability of direct measurement technologies, coupled with development of protocols to incorporate direct measurement information into inventory quantification, will increase stakeholder confidence in methane emissions reporting. We are actively working on technology and partnerships in this area.

For more than 10 years, an independent third-party assurance of Chevron's GHG emissions has been conducted. This verification includes methane emissions and was expanded in 2021 to include Chevron's GHG intensity performance data, Scope 3 emissions and GHG emissions on an operational control basis. [Chevron's annual third-party assurance of GHG emissions](#) includes Scope 1, Scope 2 and Scope 3's Category 11 "Use of Sold Products" on both an equity share and operated basis for Chevron's global operations. The objective is to assess whether the assured emissions data are reported in accordance with the principles of completeness, comparability across the organization and accuracy, including calculations, variances since the last reporting period, use of appropriate conversion factors and consolidation.

Assess the degree to which any differences would alter estimates of the Company's Scope 1 emissions

➤ Our GHG inventory estimates that methane emissions are 4.5% of our global equity Scope 1 emissions. We have assessed the potential impact to our emissions inventory if actual methane emissions hypothetically were to be 50% and 100% higher than currently reported volumes. Under these assumptions, our overall Scope 1 emissions in 2021 would have increased by 2.2% and 4.5%, respectively.

citations

- 1 Chevron Corp., *2021 Corporate Sustainability Report*, <https://www.chevron.com/-/media/shared-media/documents/chevron-sustainability-report-2021.pdf>
- 2 Chevron Corp., *2021 Corporate Sustainability Report*, <https://www.chevron.com/-/media/shared-media/documents/chevron-sustainability-report-2021.pdf>. For 2021, Chevron's overall equity Scope 1 methane emissions were 2.5 million tonnes CO₂e, of which 2.4 million tonnes CO₂e were upstream, including LNG. We provide methane emissions data and intensity performance as a mass of methane as well as its conversion under the *Intergovernmental Panel on Climate Change Fourth Assessment Report (AR4)* 100-year global warming potential (GWP) to a CO₂e. Although we strive to provide consistent data from our operated and nonoperated assets, some nonoperated assets may provide their data only on a CO₂e basis. Given the common industry practice of using the AR4 100-year GWP, we have assumed that nonoperated assets that did not provide methane mass data use a 100-year GWP of 25. We continue to work with our joint-venture partners to provide information on a standardized basis to increase transparency.
- 3 Chevron Corp., *2021 Corporate Sustainability Report*, <https://www.chevron.com/-/media/shared-media/documents/chevron-sustainability-report-2021.pdf>. For 2021, Chevron reported equity Scope 1 emissions of 57 million tonnes CO₂e, of which 2.5 million tonnes CO₂e were methane.
- 4 Chevron Corp., *2021 Corporate Sustainability Report*, <https://www.chevron.com/-/media/shared-media/documents/chevron-sustainability-report-2021.pdf>
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- 7 Well count, U.S. Energy Information Administration (EIA), *U.S. Oil and Gas Wells by Production Rate*, January 2022, <https://www.eia.gov/petroleum/wells/>; separator count and pneumatic controller count, EPA, *Natural Gas and Petroleum Systems in the GHG Inventory: Additional Information on the 1990-2020 GHG Inventory*, April 2022, https://www.epa.gov/system/files/documents/2022-02/2022_ghgi_petroleum_systems_annex35_tables.xlsx and https://www.epa.gov/system/files/documents/2022-02/2022_ghgi_natural_gas_systems_annex36_tables.xlsx
- 8 Direct measurement technologies generally provide snapshots of emissions and are not always comparable to annual emissions inventories due to different spatial, temporal and source coverage. As reconciliation protocols continue to develop, current comparisons between data types are circumstantial. External assessments of Chevron Permian assets by Kairos Aerospace noted performance, subject to the detection limits of the chosen technology, was among the lowest methane emissions detected per site. To date, advanced technology deployments in several operations have not identified any large, uninventoried emission sources, which are often cited as the main driver of deviation between emission factor-based and measurement-informed emissions inventories. Based on the detection limits of the technologies we have deployed and our emissions inventories, Chevron's current view is that snapshot detection information can help to cap potential uncertainty in inventories, although there is not a standard way to assess or disclose this information.

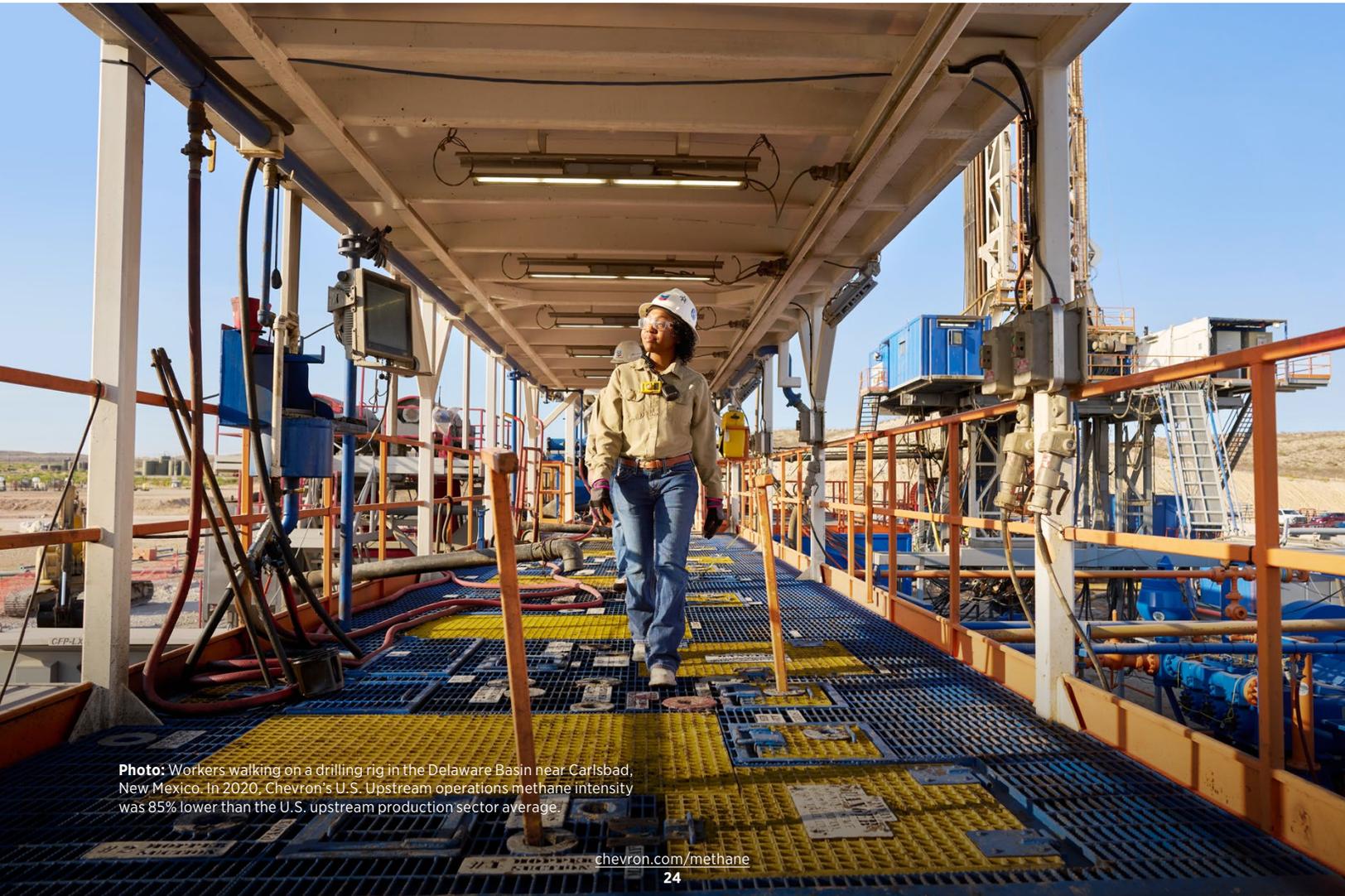


Photo: Workers walking on a drilling rig in the Delaware Basin near Carlsbad, New Mexico. In 2020, Chevron's U.S. Upstream operations methane intensity was 85% lower than the U.S. upstream production sector average.

glossary

Barrels of oil-equivalent A unit of measure to quantify crude oil, natural gas liquids and natural gas amounts using the same basis. Natural gas volumes are converted to barrels on the basis of energy content.

Carbon intensity is the amount of carbon dioxide or carbon dioxide equivalent per unit of measure.

Combustion of gas in fuel-burning equipment is not 100% efficient, and some methane emissions occur as a result of uncombusted gas being released via the equipment exhaust stream. The uncombusted proportion of gas varies between internal and external combustion sources (engines, turbines, heaters and boilers); therefore, equipment-specific data or emission factors are typically used for emissions quantification.

Detection threshold The minimum quantity or concentration of a gas (e.g., methane) that is reliably detectable by detection equipment. This is sometimes called *minimum detection limit*. Detection limits can vary based on the type of technology selected as well as the conditions during the measurement period.

Emission factor A numerical factor relating activity data (e.g., tonnes of fuel consumed, tonnes of product produced or number of pneumatic controllers) to emissions. Emission factors generally represent the amount of emissions per activity unit, for example standard cubic feet of gas per hour per pneumatic controller. Emission factors are typically developed based on a population of direct measurements of emission sources or activities.

Emissions rate The size of an emission source in terms of customary units, such as mass per time (e.g., kilograms per hour) or volume per time (e.g., standard cubic meters per hour).

Equipment leak detection is the process of identifying emissions from equipment, components and other points by screening for and detecting fugitive emissions. A screening device may be used to screen a wide area to detect the presence of fugitive methane or vented methane, and a detection device can be used to identify a specific fugitive or vented source of leak. Most detection and screening instruments and devices (particularly handheld devices) do not quantify the volume or mass of the emissions.

Flaring is the controlled burning of gas, including associated gas, in the course of oil and gas operations. In many types of operations, including those where gas is sold, reinjected or otherwise utilized, safety flaring can be an important and necessary activity to ensure safe operations. The combustion efficiency of a well-designed and operated flare is generally assumed to be greater than 98%, meaning that less than 2% of the gas passes through the flare stack unburnt. At the individual flare level, local parameters, such as gas content and quality, flare design, flow rates, exit velocities and steam use, contribute to overall combustion efficiency. There are currently no straightforward methods to continuously measure or monitor the actual combustion efficiency or destruction and removal efficiency of a flare.

Methane intensity is the amount of methane per unit of measure. Methane intensity can be determined for a facility (e.g., compressor station), an area (e.g., production basin) or even an entire value chain (e.g., from natural gas production to distribution).

Methane management is a holistic approach to addressing methane emissions performance across multiple dimensions, including actions to reduce methane emissions intensity through facility design and operational best practices; deployment of advanced technology to detect, measure and quantify site- and source-level emissions; and development and assurance of methane emissions inventories for reporting and disclosures.

Methane measurement is the process of taking a reading of the methane concentration or methane emissions rate within an air sample at a specific point in time. Typical measurement units are parts per million, parts per billion and kilograms per hour. Understanding global and local background methane concentrations is necessary to contextualize the data. Emissions measurements may be performed as one-time activities, at regular intervals or on a continuous basis, but whatever the frequency, obtaining representative measurements is important.

Methane quantification Methods for determining the size of a methane emission source in customary units of emissions rate, such as mass per time (e.g., kilograms per hour) or volume per time (e.g., standard cubic meters per hour). Methane can be quantified through engineering estimations, direct measurement of a methane source (e.g., by utilizing bagging procedures), and modeling that uses ambient measurements and meteorological data to infer an emissions rate.

Pneumatic controller An automated instrument used for maintaining a process condition such as liquid level, pressure, delta-pressure and temperature.

Routine flaring is the flaring of gas during normal oil production operations in the absence of sufficient facilities or amenable geology to reinject the produced gas, utilize it onsite or dispatch it to a market.

Super-emitter A methane source that emits a disproportionate amount compared to emissions from the total source category. Super-emitters can be continuous or episodic and can have a wide range of underlying causes, such as a failing tank control, lack of takeaway or pipeline blowdown. A recent study by NASA defines a super-emitter as a source that emits greater than 10 kilograms of methane per hour.

Upstream Operations consisting primarily of exploring for, developing, producing and transporting crude oil and natural gas (including liquefied natural gas).

additional information about this report

about this report

This report contains forward-looking statements relating to Chevron's operations and energy transition plans that are based on management's current expectations, estimates and projections about the petroleum, chemicals and other energy-related industries. These statements are not guarantees of future conduct or policy and are subject to certain risks, uncertainties and other factors, many of which are beyond the company's control, including government regulation and oil and gas prices. See Forward-Looking Statements Warning. Our ability to achieve the goals, targets and aspirations outlined in this report may depend on a variety of factors outside of Chevron's control, including successful technology advancements, making extensive progress with independent third parties, the development of policy and regulatory support, technological advancement, successful commercial negotiations and the granting of necessary permits by governing authorities.

This report covers our owned and operated businesses and does not address the performance or operations of our suppliers, contractors and partners unless otherwise noted. In the case of certain joint ventures for which Chevron is the operator, we exercise influence but not control. Thus, the governance, processes, management and strategy for those joint ventures are known to differ from those detailed in this report. All financial information is presented in U.S. dollars unless otherwise noted.

Therefore, the actual conduct of our activities, including the development, implementation or continuation of any program, policy or initiative discussed or forecasted in this report, may differ materially in the future. As with any projections or estimates, actual results or numbers may vary. Many of the standards and metrics used in preparing this report continue to evolve and are based on management assumptions believed to be reasonable at the time of preparation but should not be considered guarantees. The statements of intention in this report speak only as of the date of this report. Chevron undertakes no obligation to update publicly any statements in this report.

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If you have questions about this report, please contact:

Strategy and Sustainability
Chevron Corporation
6001 Bollinger Canyon Road, Building A
San Ramon, CA 94583-2324 USA

Produced by Corporate Strategy and Sustainability, Chevron Corporation

Design Sequel Studio, New York, sequelstudio.com

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forward-looking statements warning

CAUTIONARY STATEMENTS RELEVANT TO FORWARD-LOOKING INFORMATION FOR THE PURPOSE OF "SAFE HARBOR" PROVISIONS OF THE PRIVATE SECURITIES LITIGATION REFORM ACT OF 1995

This report of Chevron Corporation contains forward-looking statements relating to Chevron's operations and energy transition plans that are based on management's current expectations, estimates and projections about the petroleum, chemicals and other energy-related industries. Words or phrases such as "anticipates," "expects," "intends," "plans," "targets," "advances," "commits," "designs," "drives," "aims," "strives," "forecasts," "projects," "believes," "approaches," "seeks," "schedules," "estimates," "positions," "pursues," "may," "can," "could," "should," "will," "budgets," "outlook," "trends," "guidance," "focus," "on track," "goals," "objectives," "strategies," "opportunities," "poised," "potential," "ambitions," "aspires" and similar expressions are intended to identify such forward-looking statements.

These statements are not guarantees of future performance and are subject to certain risks, uncertainties and other factors, many of which are beyond the company's control and are difficult to predict. Therefore, actual outcomes and results may differ materially from what is expressed or forecasted in such forward-looking statements. The reader should not place undue reliance on these forward-looking statements, which speak only as of the date of this report. Unless legally required, Chevron undertakes no obligation to update publicly any forward-looking statements, whether as a result of new information, future events or otherwise.

Among the important factors that could cause actual results to differ materially from those in the forward-looking statements are: changing crude oil and natural gas prices and demand for the company's products, and production curtailments due to market conditions; crude oil production quotas or other actions that might be imposed by the Organization of Petroleum Exporting Countries and other producing countries; technological advancements; changes to government policies in the countries in which the company operates; public health crises, such as pandemics (including coronavirus [COVID-19]) and epidemics, and any related government policies and actions; disruptions in the company's global supply chain, including supply chain constraints and escalation of the cost of goods and services; changing economic, regulatory and political environments in the various countries in which the company operates; general domestic and international economic and political conditions, including the military conflict between Russia and Ukraine and the global response to such conflict; changing refining, marketing and chemicals margins; actions of competitors or regulators; timing of exploration expenses; timing of crude oil liftings; the competitiveness of alternate-energy sources or product substitutes; development of large carbon capture and offsets markets; the results of operations and financial condition of the company's suppliers, vendors, partners and equity affiliates, particularly during the COVID-19 pandemic; the inability or failure of the company's joint-venture partners to fund their share of operations and development activities; the potential failure to achieve expected net production from existing and future crude oil and natural gas development projects; potential delays in the development, construction or startup of planned projects; the potential disruption or interruption of the company's operations due to war, accidents, political events, civil unrest, severe weather, cyber threats, terrorist acts, or other natural or human causes beyond the company's control; the potential liability for remedial actions or assessments under existing or future environmental regulations and litigation; significant operational, investment or product changes undertaken or required by existing or future environmental statutes and regulations, including international agreements and national or regional legislation and regulatory measures to limit or reduce greenhouse gas emissions; the potential liability resulting from pending or future litigation; the company's future acquisitions or dispositions of assets or shares or the delay or failure of such transactions to close based on required closing conditions; the potential for gains and losses from asset dispositions or impairments; government-mandated sales, divestitures, recapitalizations, taxes and tax audits, tariffs, sanctions, changes in fiscal terms, or restrictions on scope of company operations; foreign currency movements compared with the U.S. dollar; material reductions in corporate liquidity and access to debt markets; the receipt of required Board authorizations to implement capital allocation strategies, including future stock repurchase programs and dividend payments; the effects of changed accounting rules under generally accepted accounting principles promulgated by rule-setting bodies; the company's ability to identify and mitigate the risks and hazards inherent in operating in the global energy industry; and the factors set forth under the heading "Risk Factors" on pages 20 through 25 of the company's 2021 Annual Report on Form 10-K and in subsequent filings with the U.S. Securities and Exchange Commission. Other unpredictable or unknown factors not discussed in this report could also have material adverse effects on forward-looking statements.



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Chevron Corporation
6001 Bollinger Canyon Road, San Ramon, CA 94583-2324 USA
www.chevron.com

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