Table of Contents

<table>
<thead>
<tr>
<th>Chairman and CEO Letter</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Governance Framework</td>
<td>5</td>
</tr>
<tr>
<td>Board Oversight</td>
<td>6</td>
</tr>
<tr>
<td>Executive Management</td>
<td>7</td>
</tr>
<tr>
<td>Organizational Management</td>
<td>9</td>
</tr>
<tr>
<td>Key Processes</td>
<td>11</td>
</tr>
<tr>
<td>Strategy</td>
<td>12</td>
</tr>
<tr>
<td>Energy Outlook</td>
<td>13</td>
</tr>
<tr>
<td>Scenario Planning</td>
<td>15</td>
</tr>
<tr>
<td>Short, Medium &amp; Long-Term Risks</td>
<td>21</td>
</tr>
<tr>
<td>Climate Change Action Plan</td>
<td>23</td>
</tr>
<tr>
<td>Impact on Business and Strategy</td>
<td>25</td>
</tr>
<tr>
<td>Financial Planning</td>
<td>28</td>
</tr>
<tr>
<td>Risk Management</td>
<td>30</td>
</tr>
<tr>
<td>Assessing Climate-Related Risks</td>
<td>31</td>
</tr>
<tr>
<td>Managing Climate-Related Risks</td>
<td>34</td>
</tr>
<tr>
<td>Integrating Climate-Related Risks into ERM</td>
<td>37</td>
</tr>
<tr>
<td>Performance Metrics &amp; Targets</td>
<td>38</td>
</tr>
<tr>
<td>Strategic Flexibility &amp; Planning</td>
<td>40</td>
</tr>
<tr>
<td>GHG Emissions</td>
<td>43</td>
</tr>
<tr>
<td>GHG Emissions Intensity Target</td>
<td>49</td>
</tr>
<tr>
<td>Carbon Capture, Use &amp; Sequestration</td>
<td>51</td>
</tr>
<tr>
<td>Water</td>
<td>52</td>
</tr>
<tr>
<td>Verification &amp; Assurance</td>
<td>53</td>
</tr>
<tr>
<td>External Collaboration</td>
<td>54</td>
</tr>
<tr>
<td>Public Policy Engagement</td>
<td>56</td>
</tr>
<tr>
<td>Climate Change Position</td>
<td>61</td>
</tr>
</tbody>
</table>

CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS

This report includes forward-looking statements based on management’s current expectations relating to our operations and business plans. Examples of forward-looking statements contained in this report include the scenarios used in our strategic planning process, including the underlying assumptions, the estimated impacts on our business, including operating costs, revenues and cost of capital, and technology related to climate-related risks. Words or phrases such as “anticipate,” “estimate,” “believe,” “budget,” “continue,” “could,” “intend,” “may,” “plan,” “potential,” “predict,” “seek,” “should,” “will,” “would,” “expect,” “objective,” “projection,” “forecast,” “goal,” “guidance,” “outlook,” “effort,” “target” or similar expressions that convey the prospective nature of events or outcomes generally indicate 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. These statements are not guarantees of future performance as they involve assumptions that, while made in good faith, may prove to be incorrect, and involve risks, uncertainties and other factors, many of which are beyond the company’s control and we cannot predict. Actual results could differ materially from anticipated results and reported results should not be considered an indication of future performance. Factors that could cause results to differ include, but are not limited to: the impact of significant declines in prices for crude oil, bitumen, natural gas, LNG and natural gas liquids; potential failures or delays in achieving expected reserve or production levels from future oil and gas developments, including due to operating hazards, drilling risks and the inherent uncertainties in predicting reserves and reservoir performance; unsuccessful exploratory drilling activities or the inability to obtain access to exploratory acreage; legislative and regulatory initiatives addressing environmental concerns, including initiatives addressing the impact of global climate change or further regulating hydraulic fracturing, methane emissions, flaring or water disposal; reduced demand for our products or the use of competing energy products, including alternative energy sources; substantial investment in and development of alternative energy sources, including as a result of existing or future environmental rules and regulations; general domestic and international economic and political developments, including changes in governmental policies relating to crude oil, bitumen, natural gas, LNG and natural gas liquids pricing, regulation or taxation; competition in the oil and gas exploration and production industry; failures in risk management and other factors discussed in this report and described in Item 1A—Risk Factors in our 2018 Annual Report on Form 10-K and any additional risks described in our other filings with the Securities and Exchange Commission (SEC). Unless legally required, ConocoPhillips undertakes no obligation to update publicly any forward-looking statements, whether as a result of new information, future events or otherwise. Third-party scenarios discussed in this report reflect the modeling assumptions and outputs of their respective authors, not ConocoPhillips, and their use or inclusion herein is not an endorsement by ConocoPhillips of their likelihood or probability.

Cautionary Note to U.S. Investors – The SEC permits oil and gas companies, in their filings with the SEC, to disclose only proved, probable and possible reserves. We use the term “resource” in this report that the SEC’s guidelines prohibit us from including in filings with the SEC. U.S. investors are urged to consider closely the oil and gas disclosures in our 2018 Form 10-K and other reports and filings with the SEC. Copies are available from the SEC and from the ConocoPhillips website.
Ryan Lance on Climate Change

Society faces perhaps the defining challenge of our times as it strives to address climate change while still supplying the energy that drives human and economic progress. These imperatives are reflected in both the Paris Agreement and the United Nations Sustainable Development Goals, which call for action on greenhouse gas emissions, sustainable development and alleviation of poverty.

For ConocoPhillips, meeting this challenge entails ongoing investment in energy development to satisfy world demand, competing financially in a volatile market, and managing climate-related risks and opportunities. We do so by applying well-established governance practices, sound strategy, diligent risk management and responsible performance.

In our strategic planning, we acknowledge the uncertainty inherent to our business. We model a variety of global energy transition scenarios to test the robustness of our portfolio and capital allocation choices. These scenarios also inform us on adapting to evolving technologies and market conditions. As a result, our actions over the last decade and our future plans were designed for resiliency and responsiveness. These same attributes are key to managing climate-related risk and the uncertainties of the energy transition.

We bring other essential strengths to our efforts, among them a geologically and geographically diverse asset portfolio. Its low cost of supply makes future development of our oil and gas resources more likely to remain economically feasible, even in low-demand scenarios aligned with Paris Agreement trajectories. At year-end 2019 our resource base included 15 billion barrels of oil equivalent with an average cost of supply of $30 per barrel. Disclosing our supply curve enables investors to judge our resiliency to lower price or demand scenarios. Adding to this resiliency are a low overall decline rate, and low capital intensity that yields increased free cash flow under reasonable price scenarios.

In support of climate protection, the ConocoPhillips Climate Change Action Plan, which has been in place since 2008, has successfully driven substantial voluntary reductions in greenhouse gas emissions. ConocoPhillips was also the first exploration and production company to set a long-term GHG intensity reduction target. We have advocated for enactment of a U.S. carbon price since 2007 and continue this advocacy through membership in the Climate Leadership Council. We believe a well-designed carbon price would reduce emissions by driving innovation, technology development and efficient end-use of hydrocarbon products.

We recognize that oil and gas industry stakeholders, particularly the financial sector, have rising expectations of our performance on climate protection. To meet these expectations, we are taking numerous actions that include improving our risk-management and governance processes, updating our climate strategy and assessing the physical risks of climate change on specific assets. As a company, we believe we exist for the benefit of all stakeholders and we embrace the opportunity to be an industry leader in delivering on this commitment.

Ryan Lance, Chairman and Chief Executive Officer, July 2020
Managing Climate-Related Risks

As we work to meet current and projected oil and gas demand in the world’s energy mix, we are focused on addressing climate-related risk.

We recognize that human activity contributes to increased atmospheric greenhouse gas concentrations, which can affect the climate. We continue to manage GHG emissions in our operations and to integrate climate change-related activities and goals into our business planning.

2019 Performance Highlights

- Established GHG emissions intensity targets for business unit.
- Enhanced the Marginal Abatement Cost Curve (MACC) process, resulting in 50% increase in projects submitted.
- Launched Managing Climate-Related Risks report.
- Developed company-wide performance criteria for compensation beginning in 2020 to measure progress on sustainable development priority risks, including actions taken to achieve the long-term GHG emissions intensity target.
Introduction

We have aligned our climate-related risk reporting with the four central themes of the Task Force on Climate-related Financial Disclosures (TCFD) recommendations — Governance, Strategy, Risk Management and Metrics and Targets. We consider both transitional and physical climate-related risks in this report. Transitional risks are those risks that arise from a world changing to low carbon energy. This includes:

- Policy and legal risks from regulation, legislation and litigation.
- Technology risks from the move toward low carbon energy production.
- Market risk from shifts in the supply and demand for fossil fuels.
- Reputational risk from changes in consumer and stakeholder behaviors.

Physical risks are the acute physical risks arising from severe climate-related weather events and the chronic physical risks arising from longer-term events such as sea level rise and sustained temperature changes.

Scenarios

The different scenarios we have developed describe possible pathways leading to a particular outcome. It is important to remember that they are hypothetical constructs and are not meant to be used as predictions of what is likely or forecasts of what we think is going to happen. Scenarios are not intended to represent a full description of the future, but rather to highlight central elements of a possible future and to draw attention to the key factors that will drive future developments. The scenarios we have developed and discuss in this report describe four possibilities out of the myriad that are possible, given the uncertainty surrounding the development of future energy markets out to 2050. They do not, and cannot, describe all possible future outcomes. As such, there is no assurance that the scenarios presented in this report are a reliable indicator of the actual impact of climate change on ConocoPhillips’ portfolio or business.

We publish certain details of our scenarios to give an insight into the analysis we use to inform our strategic decision-making. We rarely make any decision based on a single source of information, but use a range of analyses, input and information when developing our strategy. We believe sharing these scenarios will give our stakeholders and shareholders a measure of confidence that we are both preparing for reductions in greenhouse gases consistent with the Paris Climate Agreement and developing resilient strategies that reflect the complex and uncertain range of energy futures.

An important disclosure issue requiring further engagement is the use of scenario planning as a tool to characterize and disclose comparative financial risk. The key to scenario planning is the use of a wide-enough range so that uncertainty can be characterized, rather than trying to correctly guess specific future variables or parameters. We believe different low carbon scenarios that depict a wide range of future possibilities should be used to facilitate strategic planning, not as reference scenarios to compare companies. For example, addressing market price uncertainty has led us to significantly change our portfolio, capital flexibility and cost structure over a short period of time. This illustrates how misleading it can be to compare companies based on a static view of a current portfolio that will continue to change, to either a single or even a range of “reference” scenarios of the thousands that are possible. We believe that the thoughtful application of scenarios in strategic planning is core to a company’s ability to navigate future uncertainty and is a practical way of conveying this information in a decision-useful manner.
Feedback

We welcome your feedback on our approach to scenario planning or any other content in this report. If you have comments, suggestions or questions, please send them to our Sustainable Development team at SDTeam@ConocoPhillips.com.
Governance Framework

We have a comprehensive climate-related risk governance framework that extends from the board of directors, through executive and senior management to the working levels in each of our business units.

Board Oversight

In-depth board engagement.

Executive Management

Day-to-day leadership.

Organizational Management

Cross-cutting collaboration.

Key Processes

Integrated business planning.
Board Oversight

The ConocoPhillips Board of Directors oversees our position on climate change and related strategic planning and risk management policies and procedures, including those for managing climate-related risks and opportunities. In particular, the board reviews:

- Climate change position statements.
- Sustainable development risk management processes.
- Enterprise risk management policy and output.
- Corporate strategy and climate-related risk strategy.
- Climate-related risk scenarios.
- GHG emissions intensity target and progress.

The board delegates certain elements of climate oversight functions to one or more of the five standing committees: Executive, Audit and Finance, Human Resources and Compensation, Directors’ Affairs, and Public Policy. Each committee, other than the Executive Committee, is made up of independent directors and convenes at least quarterly. Issues considered by the committees are, as appropriate, regularly reported to the full board.

The Audit and Finance Committee (AFC) mandate includes enterprise risk management (ERM). The AFC facilitates appropriate coordination among the committees to ensure that our risk management processes, including those related to climate change, are functioning properly with necessary steps taken to foster a culture of prudent decision-making throughout the company. The AFC receives annual updates on how enterprise risk is being addressed, mitigated and managed across the company, including climate-related considerations that influence market, reputational, operational and political risks within the ERM system. With oversight of the company’s internal audit function, the AFC also receives summaries of internal audit results, which in 2019 included a review of the company’s ESG and climate processes and reporting.

“The board recognizes that effectively addressing climate change and ensuring human and economic progress is one of the biggest challenges facing society today. We oversee the company’s enterprise-wide approach to identifying, assessing, characterizing and managing climate-related risk as it supports the transition to a low-carbon economy.”

— BOARD PUBLIC POLICY COMMITTEE CHAIR, JODY FREEMAN
The Public Policy Committee (PPC) is responsible for identifying, evaluating and monitoring climate-related trends and risks that could affect business activities and performance. During 2019, the PPC met 5 times. Topics on the agenda included:

- Progress of the climate-related risk strategy.
- ConocoPhillips participation on the Climate Leadership Council.
- External engagement on climate-related risks.
- Progress on our GHG emissions intensity reduction target.
- Marginal Abatement Cost Curve projects.
- Updates to the risk management process including assurance.
- Progress on risk management priorities.

Other board committees also address climate-related issues. The Human Resources and Compensation Committee oversees executive compensation and performance-based components, including sustainability performance. Annual incentive programs promote achievement of strategic milestones and objectives that address stakeholder issues essential to sustaining excellence in environmental and social performance.

Read more about the skills and qualifications of our board members.

Executive Management

The Executive Leadership Team (ELT) manages climate-related risks and opportunities and assists the businesses in implementing climate-related plans. This includes:

- Reviewing and approving GHG pricing forecasts for inclusion in our long-range planning and project authorization reviews.
- Approving climate-related Variable Compensation Incentive Plan milestones.
- Reviewing the GHG emissions long-range plan and peer analysis.

Responsibility for managing climate-related issues rests with the chief operating officer (COO) and the senior vice president (SVP), Government Affairs, who report directly to the chief executive officer. The COO serves as the ELT’s climate change champion, with overall accountability for corporate planning and development, including corporate strategy and long-range planning. The SVP, Government Affairs, is responsible for public policy positions and engagement with government on climate-related public policy. These executives are briefed quarterly on emerging climate-related issues, strategic priorities and the Climate Change Action Plan in order to understand their implications and represent them to the ELT on an as-needed basis. The briefings also include three regional presidents, who oversee our global operations and environmental performance, including setting business unit goals for GHG emissions, implementing action plans and reporting GHG emissions. Examples of issues reviewed by these executives during 2019 include:

- GHG emissions intensity target implementation plan and progress.
- GHG emissions intensity target metrics for use in decision support.
- Marginal Abatement Cost Curve opportunities review and project approval.
- Marginal Abatement Cost Curve funding mechanism review and approval.
- Internal climate-related education and communications.
- Internal business unit GHG emissions targets review and approval.
- Climate risk strategy review and focus areas for 2020 update.
Climate-related risks are communicated and integrated into strategy through the SD risk management process and Enterprise Risk Management system. Climate-related risks from the corporate SD Risk Register are mapped to relevant enterprise risks. Owners of these enterprise risks, who are ELT members or senior managers, are briefed on the risks and our mitigation activities. Enterprise risks are then presented to the Audit and Finance Committee of the board.

Read how climate-related performance is a component of executive compensation.
Organizational Management

Leadership Teams

The Sustainable Development Leadership Team (SDLT) is comprised of global business unit presidents and functional department heads. Chaired by the global head, Sustainable Development, the SDLT provides consultation and approval for SD focus areas, goals, priorities, action plans and results. The Health, Safety and Environment Leadership Team (HSELT) is made up of global leaders within the function and the global head of Sustainable Development. Chaired by the vice president (VP), Health, Safety and Environment, it reviews HSE performance and drives implementation of company-wide initiatives, including implementation of the GHG emissions intensity reduction target. Strategic planning, goalsetting, implementation performance and reporting for climate-related risk are reviewed by the SDLT and HSELT.

Sustainable Development Team

Within Corporate Planning and Development, the SD team is responsible for informing the ELT and board of long-term climate-related risks and opportunities for our business and ensuring that these issues are integrated appropriately into strategic decisions. The SD group reports to the VP, Corporate Planning and Development, who reports to the COO. The Global Head, Sustainable Development, chairs the SDLT, sits on the HSELT and leads the standing SD agenda item for the PPC.

Health, Safety and Environment

The SD team works closely with the Environmental Assurance group within HSE to provide environmental metrics for public disclosure. The groups collaborate to ensure that the requisite climate risk tools, processes and procedures are developed and integrated into the company’s HSE Management System. The Environmental Assurance group reports to the VP, HSE, who reports to the COO.
Climate Change Issues Working Group (CCIWG)

The CCIWG is an internal global cross-functional group of subject matter experts that meets quarterly to discuss the external context for climate-related risk, including:

- Legislative and regulatory actions.
- Trade association activities.
- Internal activities to address climate-related risks and opportunities, including energy efficiency and emissions reduction projects.
- Developments in emissions reduction technology.
- The outlook for GHG prices that might impact our operations.
- Climate-related long-range planning issues.

The objective is to share key climate-related risk learnings across the company, identify issues and work to resolve them as they arise. The working group also provides input from subject matter experts on processes, procedures and issues prior to review by the SDLT and HSELT.

Business Units

Each ConocoPhillips business unit is responsible for identifying and monitoring near- and medium-term climate-related risks and opportunities, and integrating sustainability issues, as appropriate, into day-to-day operations, project development and decision-making. They are held accountable through an annual goal-setting process that includes the Climate Change Action Plan and GHG target progress, and they report progress to the ELT.
Key Processes

Climate-related considerations are integrated into the key business planning processes for the company:

- Scenario planning.
- Corporate strategy.
- Long-range plan.
- SD risk management process.
- Enterprise risk management.

Our SD risk management process, risk register and Climate Change Action Plan are used to track performance and guide goal setting. Line-of-sight goals for business units and key functions are shown as specific action items within the action plan. Progress against the plan is reported through our governance structure to the ELT and board of directors.

Management System Approach to Climate-Related Risk

Measure and Monitor
Track and assess actions.

Engage
Communicate risks to executives and board of directors; input to Enterprise Risk Management.

Adjust, Innovate and Continuously Improve

Identify and Map
Develop risk register which ranks corporate-wide and local risks.

Address Risk
Collaborate on strategies and action plans to manage ranked risks.
Strategy

Our objective is to manage climate-related risk, optimize opportunities and equip the company to respond to changes in key uncertainties, including government policies around the world, technologies for emissions reduction and alternative energy technologies.

Energy Outlook
World Energy Outlook Scenarios.
LEARN MORE

Scenario Planning
Understanding a range of risks.
LEARN MORE

Short, Medium & Long-Term Risks
Time horizons for climate-related issues.
LEARN MORE

Climate Change Action Plan
Addressing priority risks.
LEARN MORE

Impact on Business and Strategy
Areas for potential impact.
LEARN MORE

Financial Planning
Effect on financial planning.
LEARN MORE
In its 2019 World Energy Outlook, the International Energy Agency (IEA) illustrated a range of different energy mix scenarios in 2040. Total energy demand increases in IEA's Current Policies and New Policies scenarios and declines by around 10% compared to 2018 in the below 2-degree Celsius Sustainable Development Scenario (SDS). Demand for natural gas and oil have different outcomes across the IEA scenarios. Demand grows relative to 2018 in the Current and New Policies scenarios but declines in SDS. Even in the SDS scenario, 2040 oil demand remains at 61MMbbl/day and natural gas at 64MMboe/day (almost equal to 2018 natural gas demand) and despite a reallocation of capital to renewables, significant investment in natural gas and oil is still required. IEA estimates this to be $750 billion each year from 2021 to 2030 and then $550 billion per year to 2040 - a total of approximately $13 trillion from 2021 to 2040.

**Achieving the IEA's SDS (below 2-degree Celsius) scenario requires significant progress on several fronts:**

- Improving energy efficiency of power generation, transportation and industrial processes.
- Reducing emissions from fossil fuels, or capturing and storing or utilizing those emissions.
- Increasing the amount of non-carbon energy, such as renewables and nuclear power.
Changes in the energy system take time, as energy infrastructure components have long asset lives and change would have to go beyond replacing the power generation and distribution systems to include replacing automobile, truck, ship and aircraft fleets or retrofitting them to meet tougher specifications. Increasing renewable power utilization would also require significant improvement in the daily reliability of wind- and solar-powered electricity generation, or a significant improvement in energy storage that would reduce the amount of backup fossil fuel-fired electricity generation needed.

These widely varying factors are the reason scenario planning is important. There is not just one pathway to a low carbon future; there are numerous ways in which government action and technology development could interact with consumer behavior to bring about a lower-carbon future. Performance on climate-related risk is driven by the strength of strategic planning, including the use of widely varying scenarios, as well as the financial strength and asset flexibility to manage across a range of possibilities.
Scenario Planning

Scenarios represent plausible potential future states of the world. We use scenarios in our strategic planning process to:

- Gain better understanding of external factors that impact our business to assist in the identification of major risks and inform mitigating actions.
- Test the robustness of our strategy across different business environments.
- Communicate risks appropriately.
- Inform how we position our business, as technologies and markets evolve, to capitalize on opportunities that meet risk and return criteria.

Using scenarios enables us to understand a range of risks around potential commodity market prices associated with various greenhouse gas (GHG) reduction scenarios. To assist our capital allocation decisions, we can test our current portfolio of assets and investment opportunities against these future possibilities and identify where weaknesses may exist.

In 2019, we worked to change the way we use scenarios. Previously, we had constructed a single corporate scenario to reflect a world with carbon constraints which was subdivided into four climate-related risk scenarios to characterize possible pathways that could result from a mix of technology advancement and government policy actions. We have now combined our corporate and climate constraint scenarios into four main corporate scenarios: Current Trends, Moderate Transition, Accelerated Transition and Global Carbon Price. The scenarios were constructed using our revised global energy model and regional differences were included to reflect areas of the world that may take a different pace or direction. We also extended the duration of the scenarios to 2050. While these scenarios extend well beyond our operational planning period, they give insights on trends that could have an implication for near and medium term decisions and enable the creation or preservation of future options.

Each scenario models the full energy system including oil, natural gas, solar, wind, nuclear and storage, as well their related GHG emissions and pricing policies. Each of these plausible pathways is designed to stretch our thinking about potential rates of new technology adoption, policy development and consumer behavior. We believe that three of the four climate-related risk scenarios result in global emissions trajectories that may be capable of being Paris aligned. Only the Global Carbon Price scenario is likely to achieve this without the need for negative emissions technology beyond 2050.

Constructing four very different scenarios means that analyzing and modeling potential outcomes is not the end of the process, as we also need to understand the probability of the world moving toward a specific scenario. We monitor crucial signposts that can indicate the direction and pace of scenario changes. The objective is to connect our scenarios with our climate-related risk strategy in a way that enables comprehensive strategic decision making. By measuring changes in the key signposts, we aim to track the pace and direction of the energy transition and identify potential leading indicators of change in the demand for hydrocarbons. In this way we aim to establish not just which scenario we are moving towards, but also identify merging disruptive scenarios. This analysis is presented to executive management and the board of directors to assist in strategic decision making.
**Scenario Descriptions**

**ConocoPhillips’ Corporate Scenarios**

Source: Various ConocoPhillips estimates and 3rd party independently published projections. ConocoPhillips estimates are based on industry consultants and publicly available data. Gray area indicates the range of third-party projections.

**Current Trends**

This scenario is built on the assumption that current trends continue. Government policies for carbon emissions remain globally uncoordinated. Technologies evolve at a gradual pace and current modes of transportation and power generation remain the lowest cost, most efficient avenues for energy consumption and generation. Carbon taxes are introduced at a moderate rate in Organisation for Economic Co-operation and Development (OECD) countries, rising to only $30/tonne of CO₂ equivalent (CO₂e) in 2030. It is assumed that non-OECD countries have not implemented carbon pricing by 2050 in this scenario. Consequently, fossil fuels continue to deliver roughly 75% of global energy needs in 2050, and energy related carbon emissions continue to increase.

Supported by healthy economic growth, the global oil market grows by 25%, reaching 125 million barrels per day (MMBD) in 2050. Transportation’s share of total oil demand expands from 60% today to 65% in 2050. The automotive sector continues to evolve gradually, and the global share of electric vehicle sales increases from 1 – 2% today to...
40% in 2050. The global average internal combustion engine efficiency modestly improves, and petroleum remains the most prevalent fuel for all modes of transportation. Production from all regions and resource types are developed.

The natural gas market expands at a faster rate than oil over the long term. By 2050, natural gas demand is 75% larger than today, reaching just under 700 billion cubic feet per day (BCF/D) as growing economies utilize natural gas in all sectors. The volume of natural gas consumed in power generation more than doubles. The focal point of demand shifts away from North America and Europe towards Asia.

**Moderate Transition**

This scenario assumes moderate advances in carbon pricing policies and alternative energy technologies, with incremental shifts in consumer preferences for lower carbon products. Fossil fuels remain at roughly 75% of the primary energy mix in 2050. Carbon taxes go into effect across OECD countries during the mid-2020s and are $25/tonne CO\(_2\) (TeCO\(_2\)e) in 2030, rising to $60 in 2050. It is assumed that China implements its proposed national carbon pricing policy at 50% of the OECD carbon fee and that no other non-OECD countries implement a carbon pricing policy prior to 2050. Global energy-related carbon emissions stabilize by 2050.

Global oil demand peaks in 2040 and then declines very slowly. Average internal combustion engine efficiency improves by one-third. Electric vehicle penetration is slow in the early years but accelerates in the 2030s and 2040s, reaching 60% of the passenger auto fleet in 2050 (compared to 1% in 2019). Regional policies also influence the outcome for electrification in transportation. Global oil production benefits from technology advances which improve productivity and enable global demand to be satisfied. U.S. crude oil production grows through 2030 then falls as incremental productivity improvements slow and high-quality acreage is exhausted.

The global gas market expands by 55% by 2050. The primary driver for natural gas demand growth is power generation. Natural gas consumed in power generation increases from 140 BCF/D in 2018 to 250 in 2050. Improvements in energy storage enable wind and solar to be available throughout the day, increasing their contribution to power generation sevenfold. As in the Current Trends scenario, global demand shifts east to Asia, the Middle East and the Commonwealth of Independent States (CIS). Global supplies remain heavily weighted to North America. U.S. shale gas and Permian associated gas drive North American growth until the 2030s, after which Canada leads North America’s production growth.

**Accelerated Transition**

This is a scenario with more aggressive changes in technologies, consumer preferences and government policies relative to Moderate Transition. Technology is vital to limiting growth in energy demand, while the population and economy expand. Social trends that are prevalent today in specific regions or municipalities spread because technological advances make these choices universally economic. For example, individual auto ownership gives way to shared mobility. Mass transit and ridesharing are accessible and cost effective for more people in more regions. Consumers shift purchases toward products and services that are viewed as environmentally responsible, and society demands more transparent environmental stewardship from the businesses they patronize. Governments target aggressive policies toward GHG emissions, fossil fuel production and consumption. Carbon pricing goes into effect across OECD countries during the mid-2020s and is $30 per TeCO\(_2\)e in 2030, rising to $80 in 2050. Again, China implements its proposed carbon pricing policy at 50% of the OECD price. Other non-OECD countries impose a very low $5 per TeCO\(_2\)(e) price by 2030.
Global oil markets reach a peak by 2025 and remain near that level until tapering more quickly after 2035. The combination of internal combustion engine efficiencies and faster adoption of electric vehicles, which reach 75% of new passenger vehicle sales by 2050, reduces oil demand in the transportation sector. Oil demand from the industrial sector grows for plastics and chemicals.

The global natural gas market grows at an average annual rate of 0.6% into the 2040s, peaking at just under 450 BCF/D in 2045 before starting a gentle decline. Natural gas remains a prominent fuel in electricity generation but starts to yield market share to wind and solar in the latter years of the scenario. By the late 2040s, energy storage technology allows renewables to contribute a larger share of power generation. North America’s gas production increases 15% over today’s level, plateauing in about 2040, before declining.

**Global Carbon Price**

This scenario assumes technology breakthroughs, major social movements to reduce fossil fuel consumption and rapid global policy coordination to price GHG emissions at a level that materially reduces fossil fuel use and emissions. It also assumes that OECD countries and China implement a pricing mechanism by 2025 rising from $50/TeCO₂(e) in 2030 to $120 by 2050. Other non-OECD nations follow by imposing prices of $10/TeCO₂(e) in 2030 rising to $50 by 2050. The scenario assumes significant technological advances which reduce battery, wind and solar generation costs, improve fuel efficiencies for internal combustion engines (80% more fuel efficient by 2050), improve energy efficiency in buildings and lighting, and other advances impacting energy production, delivery and consumption. Technology and efficiencies allow total energy demand in 2050 to be 5% below today’s level with 55% of energy provided by non-fossil fuels.

The global oil market peaks in 2023, before significantly declining thereafter. Energy storage improvements lead to 80% of new passenger automobile sales being electric in 2050. Consequently, transportation sector demand falls to 22% of total oil demand. Industrial demand becomes the largest proportionate sector at 45% as petroleum derived chemicals and plastics remain vital to many sectors. Oil supply dynamics evolve as most production occurs in OPEC countries and Russia and geopolitics play an even larger role in oil prices and the supply and price of oil.

Like oil, the natural gas market peaks in 2023. Natural gas generates only 8% of global electricity in 2050, while wind and solar grow to produce 55% of electricity in 2050. Global gas demand shifts to emerging markets in Asia, the Middle East, CIS and Africa. Only 20% of global gas demand remains in North America and Europe. The market also becomes more reliant on OPEC and Russia for supply as North American gas output declines.
Our scenarios indicate a wide range of oil and natural gas prices. We take this future price uncertainty into account in our strategy by only sanctioning projects with a fully loaded cost of supply which is less than $40 per barrel (WTI) in 2019 dollars. Of our 15 billion barrels of resources with a cost of supply below $40 per barrel, 13.5 billion have a cost of supply below $35 per barrel.

None of the scenarios include a significant contribution to emission reductions from carbon capture and storage.

The scenarios are designed to address transitional risks. A separate scenario process addresses physical climate-related risk using consultant scenarios based on the Intergovernmental Panel on Climate Change (IPCC) modeling.

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“By using scenarios to model the entire energy system, we can better understand and evaluate the energy transition as it unfolds and use that information in our long-term strategic planning”

— CHIEF OPERATING OFFICER, MATT FOX
Key Strategic Linkages to our Scenario Planning

Our corporate strategy reflects several findings from our scenario analyses. We have acted to:

- Use a fully loaded cost of supply, including cost of carbon where legislation exists, as an important metric in our project authorization process. Our portfolio changes have created a resource base of 15 billion barrels of oil equivalent with less than a $40 per barrel cost of supply and an average cost of supply of less than $30 per barrel. Our strategic objective is to provide resilience in lower price environments, with any oil price above our cost of supply generating an after tax fully burdened return greater than 10%.
- Prepare for diverse policy environments by maintaining a less than $40 per barrel of oil equivalent sustaining price that will generate the cash to fund capital expenditure to keep production flat over time and generate a dividend to shareholders.
- Maintain diversification in our portfolio to be able to balance our production and capital expenditures as commodity prices become more volatile.
- Provide a distinctive payout of cash flows to investors.
- Identify and fund profitable emissions reduction projects, including methane emissions reductions. Reducing our scope 1 and scope 2 emissions intensity reduces the impact of any future regulations, or the introduction of carbon prices or taxes, and helps maintain our low cost of supply into the future. We have upgraded the use of a marginal abatement cost curve (MACC) in long-range planning to identify the most cost effective emissions reduction opportunities available to the company globally. These process upgrades have resulted in more efficient collection, recording, sharing and funding of emission reduction projects.
- Introduce a proxy cost of carbon into qualifying project sensitivities to help us be more resilient to climate-related risk in the short to medium term and provide the flexibility to remain resilient in the long term.
- Focus near-term technology investments on reducing both costs and emissions where feasible.
- Monitor for potential disruptive technologies that might impact the market for natural gas or oil, enabling us to take advantage of our capital flexibility and reduce our exposure to lower commodity prices at an early point in time.
- Focus on the carbon and cost competitive supply of natural gas and oil while continuing to utilize our scenario planning system to monitor and assess additional business opportunities within the evolving energy transition.
- Monitor global regulatory and legislative developments and engage in development of pragmatic policies aligned with the climate policy principles outlined in our Global Climate Change Position.

Note

1 All carbon taxes are in 2019 dollars.
Short, Medium & Long-Term Risks

As described in the Risk Management section, we evaluate and track our climate-related risk through our SD Risk Register and Climate Change Action Plan. Those risks broadly fall into four categories:

- Greenhouse gas (GHG) related policy.
- Emissions and emissions management.
- Climate-related disclosure and reporting.
- Physical climate-related impacts.

The time horizons we use for climate-related issues are based on the time taken for the risks to manifest themselves, our planning time horizons and the time required to realize the majority of the net present value of our projects.

Short-Term Risks

Our short-term time horizon is one to five years, during which we can complete short-cycle drilling campaigns and small projects. Our GHG forecasting and financial planning processes are used to determine risks and opportunities that could have a material financial impact for that period. Our short-term climate-related risks are generally government policy-related and managed at the business unit level through policy advocacy and technology to reduce emissions.

Regulations to address climate-related risk, including GHG emissions, are a short-term risk for several of our businesses. For example, regulations issued by the Alberta government in 2019 under the Emissions Management and Climate Resilience Act require any facility existing in 2016, with emissions equal to or greater than 100,000 metric tons of carbon dioxide or equivalent per year, to reduce the net emissions intensity, with reduction increases over time. The cost of compliance and investment in emissions-intensity reduction technologies influence investment decisions for the Canada business unit, where we are purchasing carbon offsets while evaluating and developing technology opportunities to reduce emissions for existing and new facilities. A good example of technology development is our piloting and roll-out of non-condensable gas co-injection at our oil sand operations, which have improved steam-to-oil ratios by 20-30% in 2019, thereby decreasing GHG intensity.

GHG or carbon prices are another near-term risk in some jurisdictions where we operate. For example, in our Norway business unit, we are managing carbon price risk with specific actions to study emissions reduction opportunities, and we also evaluate project economics with full Norwegian CO₂ tax and European Union emissions allowance costs.
While a price on carbon in the U.S. will increase our costs and decrease demand for our product, we support a well-designed pricing regime on carbon emissions as the most effective tool to reduce greenhouse gas emissions across the economy. By putting a price on carbon, the U.S. would also maintain the energy advantage it currently has while at the same time building credibility with OECD countries and incentivizing other countries to also price carbon. We are a Founding Member of the Climate Leadership Council (CLC), a collaboration of business and environmental interests working to develop a carbon dividend plan for the U.S. The plan has four key pillars: a gradually increasing price on carbon, a carbon dividend, border carbon adjustments and regulatory simplification. Read more about the carbon dividend plan.

Medium-Term Risks

Our medium-term time horizon is six to 10 years, during which we can complete most major projects and revise our portfolio significantly if required. Our GHG forecasting and financial planning processes are used to determine the risks and opportunities that could have a material financial impact for that period. Medium-term risks take longer to impact our business and may include emerging policy that is not yet fully defined. These risks are managed by business unit planning, but if significant, may also be managed by corporate strategies and company-wide risk assessments.

Offset requirements have been identified as both a medium-term risk and as an opportunity for some business units where carbon offsets can be used for compliance with an emissions reduction program.

Chronic physical changes are a medium-term risk for some of our operations. Temperature extremes could impact facilities located in Arctic regions if warmer temperatures reduce the length of the ice road season and restrict well and facility construction times. Mitigation measures could include utilizing gravel road connections to reduce reliance on ice roads, pre-packing to extend the start of ice road season and constructing roads that prevent permafrost thawing.

Long-Term Risks

Our long-term time horizon is 11 years and beyond. Generally, long-term risks are managed by our scenario analysis and climate-related risk strategy, as they include long-term government policy, technology trends and consumer preferences that affect supply and demand. They may also include risks that align with long-term physical climate scenarios.

We recognize that our GHG intensity will be compared against peers, so we track this as a competitive risk at the corporate level. Investors, the financial sector and other stakeholders compare companies based on climate-related performance, and GHG intensity is a key indicator. For this reason, our GHG intensity target aligns with the long-term time horizon to ensure we manage the risk appropriately. It also demonstrates our goal to be a leader in managing climate-related risk.

Both chronic and acute physical climate risks are a long-term risks for our business. In some parts of the U.S. we have identified potential storm severity as a risk for future operations, based on previous storms and flooding. Science suggests that future extreme weather events may become more intense or more frequent, thus placing at risk our operations in coastal regions and areas susceptible to typhoons or hurricanes. We have a crisis management system in place to manage that risk before, during and after a storm event.
Climate Change Action Plan

Our Climate Change Action Plan addresses the significant or high risks from our Sustainable Development (SD) Risk Register and includes milestones over a number of years. Actions within the plan address individual risks identified by our business units or global/regional risks identified by our central corporate staff. For example, both chronic and physical climate-related impacts are more likely to apply to a single business unit, given the specific local nature of the risk and geographical location of our assets.

### Climate Change Action Plan

<table>
<thead>
<tr>
<th>Risks</th>
<th>2019 Mitigation Actions And Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GHG Policy</strong></td>
<td></td>
</tr>
<tr>
<td>GHG regulations, including carbon taxes</td>
<td>• Complete process to inform company position on the direct regulation of methane.</td>
</tr>
<tr>
<td></td>
<td>• Review global emerging issues with Public Policy Leadership Team on a regular basis.</td>
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<td></td>
<td>• Work with Climate Leadership Council and API Climate Working Group to develop and implement U.S. carbon tax design.</td>
</tr>
<tr>
<td></td>
<td>• Focus on operational efficiency globally to reduce GHG intensity.</td>
</tr>
<tr>
<td></td>
<td>• Integrate global Marginal Abatement Cost Curve with corporate technology group plans and pilots.</td>
</tr>
<tr>
<td><strong>GHG Offset requirements</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Establish global corporate position and strategy on carbon offsets purchases.</td>
</tr>
<tr>
<td><strong>Emissions and Emissions Management</strong></td>
<td></td>
</tr>
<tr>
<td>Air emissions regulations</td>
<td>• Engage with U.S. EPA to develop mutually acceptable work practices and emission limits.</td>
</tr>
<tr>
<td></td>
<td>• Develop U.S. flare reduction plans.</td>
</tr>
<tr>
<td>GHG intensity relative to peers</td>
<td></td>
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<tr>
<td>--------------------------------</td>
<td></td>
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<tr>
<td>• Report externally on global corporate GHG emissions intensity target performance.</td>
<td></td>
</tr>
<tr>
<td>• Work with global business units to identify and improve GHG estimation methodologies and set internal business unit emission targets.</td>
<td></td>
</tr>
<tr>
<td>• Identify and implement GHG emission reduction projects at the business unit level.</td>
<td></td>
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<tr>
<td>• Develop business unit GHG implementation plans and establish steering teams where appropriate</td>
<td></td>
</tr>
<tr>
<td>• Establish U.S. Innovation &amp; Technology manager to identify opportunities for enhanced detection and quantification of GHG emissions.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Climate-Related Disclosure and Reporting</th>
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<tbody>
<tr>
<td>• Update global web-based climate risk report, integrating appropriate feedback.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Climate-Related Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Investigate developing a satellite monitoring program for lakes to evaluate thermokarst development and assess risk to critical water sources.</td>
</tr>
<tr>
<td>• Utilize assessment approaches on critical water bodies and implement preventative measures to minimize melting of ice wedges where prudent.</td>
</tr>
<tr>
<td>• Increase application of mitigation measures (fresh water use minimization) in project design phase. Investigate alternative sources for water (e.g. pipelines, desalination, etc.). Consider rotation of fresh water source.</td>
</tr>
<tr>
<td>• Develop global physical risk assessment guidelines for business units and continue with ongoing review cycle.</td>
</tr>
<tr>
<td>• Continue assessment of risk of permafrost thaw for new construction. Continue implementation of mitigation measures. Investigate cost-effective approaches for monitoring permafrost thaw and thaw degree days.</td>
</tr>
</tbody>
</table>

Note: Actions relate to specific business units unless indicated as “global.”
Impact on Business and Strategy

Climate-related risks have the potential to impact our business in several ways. Our SD risk management processes identify those risks and assess the potential size, scope and prioritization of each. We have aligned a description of these impacts with the recommendations of the TCFD.

Products and Services

Compliance with policy changes that create a GHG tax, fee, emissions trading scheme or GHG reductions could significantly increase product costs for consumers and reduce demand for natural gas- and oil-derived products. Demand could also be eroded by conservation plans and efforts undertaken in response to global climate-related risk, including plans developed in connection with the Paris Agreement. Many governments also provide, or may in the future provide, tax advantages and other subsidies to support the use and development of alternative energy technologies that could impact demand for our products. However, there are also opportunities associated with increased demand for lower-carbon energy sources such as natural gas to displace coal in power generation and in combination with carbon capture and storage in the production of hydrogen for industrial use.

Our scenario analysis indicates that as the energy sector transitions, it will be important to be competitive on both cost of supply and GHG emission intensity. We have adjusted our portfolio to concentrate on lower-cost production and have divested some of our higher-emissions-intensity natural gas and oil sands fields. We have also set a GHG emissions intensity reduction target for our scope 1 and scope 2 emissions.

Supply Chain and/or Value Chain

We engage with suppliers on the environmental and social aspects of their operations and supply chains through each step of the procurement process, from supplier prequalification through supplier performance evaluation. This includes communicating our expectations and priorities and identifying opportunities for improvement and collaboration related to climate issues, including energy use, GHG management and environmental supply chain risks. We also engage through membership in several trade associations, such as IPIECA, that address climate-related issues through working groups and task forces that include downstream businesses as well as suppliers. We continue to monitor climate-related risks and opportunities related to our supply chain and value chain and believe that maintaining a global network of businesses and suppliers will mitigate physical climate-related risks.
Adaptation and Mitigation Activities

While our business operations are designed and operated to accommodate a range of potential climate conditions, significant changes, such as more-frequent severe weather in the markets we serve or the areas where our assets are located, could cause increased expenses and impact to our operations. The costs associated with interrupted operations will depend on the duration and severity of any physical event and the damage and remedial work to be carried out. Financial implications could include business interruption, damage or loss of production uptime and delayed access to resources and markets. For example, a three-day shutdown of all U.S. Gulf Coast production would cause $35 million in lost revenue, based on the 2019 average production and our average worldwide realized price of $48.78 per barrel of oil equivalent (BOE). It is likely that not all our Gulf Coast area production would be affected, as assets further inland are less susceptible to hurricanes than offshore assets in the Gulf of Mexico.

Business-resiliency planning is a process that helps us prepare to mitigate potential physical risks of a changing climate in a cost-effective manner. During Hurricane Harvey in 2017, we put our hurricane and crisis response training and business continuity plans into action in the United States. Prior to Harvey’s landfall, Lower 48 employees safely shut down and secured Eagle Ford production and associated facilities. Personnel were evacuated from our Magnolia platform in the Gulf of Mexico, though production remained online. Once the storm passed, production in the Eagle Ford resumed within several days, despite unprecedented conditions and infrastructure constraints in the area.

We continue to conduct workshops on resiliency risks in key business units to establish future mitigations for potential physical changes to the operating environment. Business units in Texas, Alaska, Canada and Australia have participated in this process and integrated the results into their goals. In 2019 we facilitated a workshop in Canada and produced a report on the resiliency risks around our new Montney development.

Research and Development

Technology will play a major role in addressing GHG emissions, whether through reducing fugitive emissions or lowering the energy intensity of our operations or value chain. In Canada we are sponsoring the NRG COSIA Carbon XPRIZE to incentivize and accelerate development of technologies that convert carbon dioxide into valuable products.

Our annual MACC process identifies and prioritizes our emissions-reduction opportunities from operations based on the cost per tonne of carbon dioxide equivalent abated. This data helps identify projects that might become viable in the future through further research, development and deployment. As a result of this work, we have focused our near-term technology investments on reducing both costs and emissions where feasible, such as improving the steam-to-oil ratio in the oil sands. Part of a new research and development effort is a multilateral well technology pilot, which enables the drilling of multiple lateral sections without the need for additional above ground capital or additional steam injection, thereby reducing emissions intensity and operating costs.

Over the past three years we have spent more than $400 million on research and development, equipment, products and services which have reduced our GHG emissions. Large scale commercial deployment projects include:

- Eliminating the majority of methane emissions by using air, rather than natural gas, to drive equipment at our Montney development in Canada.
- Reducing emissions by electrifying plant and pad equipment in Alaska.
- Installing vapor recovery systems to capture methane emissions in Lower 48.
Investments Which Reduced GHG Emissions

<table>
<thead>
<tr>
<th>Technology Area</th>
<th>Stage Of Development</th>
<th>2017, 2018, 2019 Investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficiency</td>
<td>Applied research and development</td>
<td>$2 million</td>
</tr>
<tr>
<td>Pilot demonstration</td>
<td></td>
<td>$40 million</td>
</tr>
<tr>
<td>Small-scale commercial deployment</td>
<td></td>
<td>$26 million</td>
</tr>
<tr>
<td>Large-scale commercial deployment</td>
<td></td>
<td>$206 million</td>
</tr>
<tr>
<td>Methane Detection and Reduction</td>
<td>Applied research and development</td>
<td>$2 million</td>
</tr>
<tr>
<td>Large-scale commercial deployment</td>
<td></td>
<td>$5 million</td>
</tr>
<tr>
<td>Other Emission Reductions</td>
<td>Small-scale commercial deployment</td>
<td>$3 million</td>
</tr>
<tr>
<td></td>
<td>Large-scale commercial deployment</td>
<td>$142 million</td>
</tr>
</tbody>
</table>

Operations

We have acted to mitigate our GHG emissions for many years. Our first Climate Change Action Plan was introduced in 2008, and since then we have voluntarily reduced our annual global GHG emissions compared to business as usual. In 2017, we introduced a long-term GHG emissions intensity target to incentivize reductions in our production operations as well as project design, exploration and portfolio decisions. To date, this has resulted in a reduction of both our emissions intensity and our absolute emissions. Most of the reduction projects carried out since 2008 have paid for themselves through increased sales of natural gas. Around two-thirds of the projects carried out relate to the reduced emissions of methane from reduced venting, updated plunger lifts or replacing pneumatic controllers.

To continue those reductions, we have set up regional teams in North America, Australia, Southeast Asia and Europe to use the MACC process to identify energy efficiency projects for consideration in the Long-Range Plan. By evaluating our day-to-day decisions regarding flaring, drilling, completions and equipment use we have gained a sharper focus on energy consumption, along with increased revenue, reduced energy costs, reduced emissions and an improved overall cost of supply.

We are one of more than 80 companies participating in The Environmental Partnership, a coalition of natural gas and oil companies focused on accelerating environmental performance improvements from operations across the United States. The partnership prioritizes managing methane emissions and aligns with our focus on emissions reductions and high environmental standards.
Financial Planning

We take climate-related issues into account in our financial planning in several ways. In the short to medium term, we use a range of commodity prices derived from our scenario work. In the longer term our scenarios provide insight into the possibilities for future supply, demand and price of key commodities. This helps us understand a range of risk around commodity prices, and the potential price risk associated with various GHG reduction scenarios. History has shown an interdependency between commodity prices and operating and capital costs. In the past, lower commodity prices have driven down operating and capital costs, whereas the opposite has been true when commodity prices have risen. We have aligned a description of the potential impacts on financial planning with the recommendations of the TCFD.

Operating Costs and Revenues

New or changing climate-related policy can impact our costs, demand for fossil fuels, the cost and availability of capital and exposure to litigation. The long-term impact on our financial performance, either positive or negative, will depend on several factors, including:

- Extent and timing of policy.
- Implementation detail such as cap-and-trade or an emissions tax or fee system.
- GHG reductions required.
- Level of carbon price.
- Price, availability and allowability of offsets.
- Amount and allocation of allowances.
- Technological and scientific developments leading to new products or services.
- Potential physical climate effects, such as increased severe-weather events, changes in sea levels and changes in temperature.
- Extent to which increased compliance costs are reflected in the prices of our products and services.

The long-term financial impact from GHG regulations is impossible to predict accurately, but we expect the geographical reach of regulations and their associated costs to increase over time. We model such increases and test our portfolio in our long-term transitional scenarios.

Capital Expenditures and Capital Allocation

We test our current portfolio of assets and investment opportunities against the future prices generated from our corporate scenarios and identify where weaknesses may exist, assisting with our capital allocation. As a result of our strategy and scenario work, we have focused capital on lower cost-of-supply resources, reducing our investments in oil sands and exiting deep water while increasing our investments in unconventional oil projects.
Acquisitions and Divestments

Business development decisions consider the impact to our portfolio from the financial, operational and sustainability perspectives. In our long-range planning process, we run sensitivities on our GHG emissions intensity based on possible acquisitions, divestments and project decisions. We focus on cost of supply to account for lower and more volatile product prices and possible introduction of carbon taxes. In recent years, we have divested higher emissions intensity assets, such as oil sands and some older gas fields.

Access to Capital

In addition to cost of supply and carbon, we also strive to compete more effectively by earning the confidence and trust of the communities in which we operate, as well as our equity and debt holders. We consider how our relative environmental, social and governance performance could affect our standing with investors and the financial sector, including banks and credit-rating agencies. Our engagement with investors has focused on climate-related risks in many one-on-one meetings and periodic conferences, such as with the Interfaith Center on Corporate Responsibility. In 2019, we also built on the success of our 2018 Sustainable Development workshop and held a meeting in which stakeholders from banks, credit rating agencies and other financial institutions engaged with our sustainable development subject matter experts and members of our Executive Leadership Team. We have also engaged on climate-related issues and sustainability risks with institutions such as Moody’s and Standard & Poor’s. An important priority in our corporate strategy has been to pay down debt and target an “A” credit rating to maintain, facilitate and ensure access to capital through commodity price cycles.

Carbon Asset Risk

Scenario analysis and our climate-related risk strategy help build optionality into our strategic plans to reduce the risk of stranded assets. Key elements of our climate-related risk management process include: considering a range of possible future carbon-constraint scenarios; developing strategic alternatives to manage shareholder value in a future with uncertain carbon constraints; testing strategies and asset portfolios in various scenarios; developing actionable insights, and incorporating risk mitigation actions into the Long-Range Plan and Climate Change Action Plan.

We have taken action to reduce our cost of supply and are the only oil and natural gas company to transparently disclose the full cost-of-supply of our reserve base. Combined with our belief that we have the lowest sustaining capital required to maintain flat production among our peers, this demonstrates a competitive advantage in reducing carbon asset risk. The cost of supply of our resource base shown in the Metrics and Targets (link) section supports our assertion that resources with the lowest cost of supply are most likely to be developed in scenarios with lower demand, such as the IEA’s Sustainable Development Scenario.

All U.S. publicly traded companies must adhere to a consistent set of regulations that enable investors to evaluate and compare investment choices. We fully comply with rules and regulations, including for reporting natural gas and oil reserves. In order to meet the Securities and Exchange Commission requirement that reserve estimates be based on current economic conditions, our reported reserves are determined by applying a carbon tax only for jurisdictions with existing carbon tax requirements. We have also increased our disclosure over the years to offer investors and stakeholders additional insights into the processes and procedures we use to manage climate-related risks, including carbon asset risk.
Risk Management

We utilize an integrated management system approach to identify, assess, characterize and manage climate-related risks. This system links directly to the enterprise risk management (ERM) process, which includes an annual risk review by executive leadership and the board of directors.

Assessing Climate-Related Risks
Assessing physical and transition risk for operations.

Managing Climate-Related Risks
Adapting to a range of scenarios.

Integrating Risks into ERM
Ranking risks to our business.
Assessing Climate-Related Risks

The diagram below illustrates how we assess climate-related physical and transition risk for operations, developments and new major projects.

To understand long-term risk and mitigation options, we have developed four scenarios (link). Depending on the deployment of carbon capture and storage and negative emissions technologies beyond 2050, we believe three of the scenarios may be capable of achieving an emissions trajectory consistent with the aims of the Paris Agreement. Utilizing this scenario approach helps us evaluate distinct outcomes related to the potential timing and intensity of government climate change policy development, the pace of alternative energy technology development and trends in consumer behavior. This information is then used to shape our analysis and consideration of various outcomes for policy, technology and market risk. Read more about our use of scenarios.

We periodically review emerging climate-related risks with our Executive Leadership Team as part of our scenario monitoring system. A cross-functional team enters events into a centralized database that is reviewed regularly for indications that risks are changing or developing. We use this “early warning” system to inform our strategies in a timely manner so that we can identify and implement effective mitigation measures. The scenario monitoring system helps us understand the pace and direction of the energy transition. For example, if regulations and technology were moving more quickly than in our scenarios, this would indicate that we might be moving to a 1.5-degree scenario similar to the range identified in the recent IPCC “1.5 degree” report, and we would take action accordingly. In our resiliency workshops, we use externally produced scenarios that describe the range of possible future physical risk.

SD Risk Management Process

As part of the annual risk management process mandated by our SD Risk Management Standard, we examine operated assets and major projects against the physical, social and political settings of our operations. Subject matter experts in each business unit (BU) and project identify and describe climate-related risks.

Each risk is then assessed using a matrix that evaluates both its likelihood and consequence. Risks rated significant or high are included in the corporate SD Risk Register. In evaluating the consequence level, we consider potential impacts on employee and public safety, socio-cultural and economic impacts to stakeholders, environmental impact, and reputational and financial implications. As part of the process, we examine the interdependence of risks.
and work to identify emerging risks such as new regulatory requirements and emerging greenhouse gas (GHG) pricing regimes.

Read more about our risk register and Climate Change Action Plan.

Resiliency Planning Workshops

We facilitate resiliency planning workshops in key BUs to identify and assess the risks and opportunities associated with the physical impacts of changing climate and the potential technology and solutions to mitigate risks and take advantage of opportunities. These workshops are conducted on a periodic basis to ensure that our operations have access to the most up-to-date science provided by qualified consultants to inform their engineering and infrastructure decisions. In 2019 we facilitated a workshop in Canada and produced a report on the resiliency risks around our new Montney development.

Climate-Related Risk Assessment

A climate-related risk assessment is conducted on any future project development that costs more than $50 million net and is expected to emit more than 25,000 metric tons CO₂ equivalent (CO₂(e)) net to ConocoPhillips during any year of its lifespan. This assessment is mandatory for investment approval. Project teams for qualifying projects are required to assess the potential risks and opportunities associated with GHG emissions, GHG regulation and a physically changing climate based on local jurisdictions and geographies as opposed to using our corporate scenarios. The climate risk assessment guideline provides a framework for project teams to:

- Forecast GHG emissions for the life of the project.
- Evaluate climate-related risks and opportunities, including physical and transition risks that apply to the project.
- Make decisions on GHG emissions control in project design, including energy efficiency solutions, power source selection, emissions management, carbon capture and storage/utilization, and external compliance options such as the purchase or origination of GHG offsets.
- Evaluate the potential cost of GHG emissions in project economics.

We assess climate-related risks early in the project engineering stage to better inform our investment decisions and facility design. The ConocoPhillips Health, Safety and Environment (HSE) Due Diligence Standard also provides further guidance on accounting for sustainable development issues for new acquisitions, new business ventures, joint ventures and real property transactions.
Project Authorization

In 2019, our corporate authorization process required all qualifying projects to run a GHG pricing sensitivity using a price of $40 tonnes CO₂(e) (TeCO₂(e)), plus annual inflation, for all scope 1 and scope 2 GHG emissions produced in 2024 and later. Projects in jurisdictions with existing GHG pricing regimes incorporated that GHG price forecast into their base case economics. Where existing GHG price regulation is below the $40 TeCO₂(e) corporate price, the $40/TeCO₂(e) sensitivity is run from 2024 onward. This ensures that both existing and emerging regulatory requirements are considered in our decision-making.

Pricing sensitivity impact - We evaluated an international gas development opportunity in an existing field with high native CO₂ content. Testing it against the $40/tonne sensitivity price indicated it was economically challenged without the availability of offsets or the potential for carbon capture and storage. When we took the carbon price sensitivity into account with other risk factors, we decided not to pursue the project.
Managing Climate-Related Risks

Our climate-related risk management process is designed to drive appropriate action for adapting to a range of possible future scenarios. Through integrated planning and decision-making, we develop mitigation plans for climate-related risk, track performance against our goals and adjust our plans as we learn and conditions evolve.

Local risks and opportunities related to our operations and projects are assessed and managed at the BU level, enabling tailored business goals to address the challenges and opportunities unique to each region’s operations. Reporting and overarching climate-related risks, such as GHG target-setting and prioritization of global emissions-abatement projects, are managed at the corporate level.

The diagram below shows a simplified process flow of our climate-related risk management process.

Corporate Strategy

Our corporate strategy and the embedded Climate-Related Risk Strategy are informed by the output of our corporate scenarios and the risk management system. Examples of impacts on our corporate strategy include:

- Reducing the sustaining price of the company — the equivalent oil price at which we can sustain production and pay our dividend.
- Lowering the cost of supply to manage market risk.
- Maintaining a diversified portfolio of projects and opportunities.
- Diversifying our portfolio to include assets with lower decline rates and low capital intensity to drive higher free cash flow yields.
- Developing technologies that reduce both costs and emissions.
- Monitoring alternative energy technologies.

The objective of our Climate-Related Risk Strategy is to manage climate-related risk, optimize opportunities and equip the company to respond to changes in key uncertainties, including government policies around the world, technologies for emissions reduction, alternative energy technologies and changes in consumer trends. The strategy sets out our choices around portfolio composition, emissions reductions, targets and incentives, emissions-related technology development, and our climate-related policy and finance sector engagement.

In 2017, in accordance with our strategy, we set a public long-term GHG emissions target based on the architecture of the Paris Agreement, with an aspiration to become a leader in GHG climate-related risk management.
Long-Range Plan

The ConocoPhillips Long-Range Plan provides the data that underlies our corporate strategy and enables us to test our portfolio of projects against our climate-related risk scenarios, and thus make better-informed strategic decisions.

We use a marginal abatement cost curve (MACC) process to collect potential GHG emissions reduction projects from our business units, prioritize them based on their cost and reduction volume, and implement the most cost-effective projects. As a result of our focus on emissions reductions, we have completed the installation of non-condensable gas co-injection in the Canadian oil sands to enhance production while reducing energy consumption and emissions. In the U.S. Lower 48, we have changed the design of some new facilities to include instrument air packages rather than gas-driven devices, reducing methane emissions from those sites. To continue those reductions, we have set up regional teams in North America, Australia, Southeast Asia and Europe to use the MACC process to identify additional energy efficiency projects. Output from the MACC informs our annual budget, Long-Range Plan and technology strategy.

SD Risk Management Process and Climate Change Action Plan

The SD risk management process ensures that a Climate Change Action Plan is developed to track mitigation activities for each climate-related risk included in the corporate SD Risk Register. This plan includes details about our commitments, related responsibilities, resources and milestones. As part of annual updates to the register, the action plan and its effectiveness are evaluated, and decisions are made to continue mitigation measures, add new measures, or simply monitor the risk for further developments. The table below lists our key SD risk management processes, their scope and purpose.
Corporate strategy Corporate/portfolio Deﬁnes the company’s direction for exploration and development, including portfolio, capital allocation and cost structure.

Climate-related risk strategy Corporate/portfolio Identifies options to reduce and mitigate climate-related risks as policies, markets and technologies develop over time.

GHG emissions intensity target Business units and qualifying projects Drives actions, reviews and management of future policy and market risk.

Long-Range Plan Corporate/portfolio Forecasts key data for our corporate strategy covering our proposed portfolio development and performance, including production, costs, cash ﬂows and emissions.

Marginal abatement cost curve (MACC) Business units Collects a list of GHG emissions-reduction projects across our business units and prioritizes them based on cost and emissions abated.

SD risk management process Corporate, business units and qualifying projects Records all SD-related risks that are prioritized as signiﬁcant and high in the SD Risk Register to ensure that mitigation progress is reported and issues are managed effectively.

Climate Change Action Plan Corporate, business units and qualifying projects Records mitigation actions, milestones and progress in managing climate-related risks from the SD Risk Register.

Read more about our Risk Register and Climate Change Action Plan.
Integrating Climate-Related Risks into ERM

Climate-related risks from the corporate SD Risk Register are mapped to key categories in the enterprise risk management process. Descriptions of these risks and mitigation measures from the Climate Change Action Plan are shared with Enterprise Risk Management (ERM) risk owners to inform their assessments of risk ranking, corporate actions and mitigations. Each risk owner evaluates and prioritizes risks in their area based on likelihood and consequences, thereby determining the relative significance of climate-related risks in relation to other enterprise risks.

The ERM process is a direct input into our strategic planning process. By identifying major cross-cutting risks and trends, we closely link action plan efforts to key performance issues and address and mitigate identified risks. The board regularly reviews the ERM system and mitigation actions.

Information about issues deemed material to our investors may be found in our Security and Exchange Commission (SEC) filings.
Performance Metrics & Targets

We calculate key metrics and use targets to measure and monitor our performance and progress in managing climate-related risks and opportunities in line with our strategy and risk management process. These include:

- Internal proxy greenhouse gas (GHG) pricing and the financial impact of existing GHG pricing on our businesses across the globe.
- Scope 1, scope 2 and scope 3 GHG emissions.
- Metrics for water, methane and flaring.
- GHG emissions intensity target.

We believe these metrics and targets are the most useful in managing climate-related risks and opportunities and monitoring performance.

All data is from January 1 to December 31, 2019. Our Performance Metrics footnotes outline the scope and methodologies of our data reporting. The minimum boundary for reporting on environmental priorities is assets we operate.

Strategic Flexibility & Planning
Robust and flexible corporate strategy.
LEARN MORE

GHG Emissions
Measuring our emissions performance.
LEARN MORE

GHG Emissions Intensity Target
Reducing GHG Intensity.
LEARN MORE

Carbon Capture, Use & Sequestration
Converting carbon.
LEARN MORE
Water
Climate change and water.
LEARN MORE

Verification & Assurance
Independent, third-party verification.
LEARN MORE
Strategic Flexibility & Planning

A robust and flexible corporate strategy will be key to navigating the energy transition. The three key strategy components for an exploration and production company are portfolio, capital allocation and management of uncertainty. We manage uncertainty by focusing on the fundamental characteristics that drive competitive advantage in a commodity business — a low sustaining price, low cost of supply, low decline rates and low capital intensity that drive free cash flow, capital flexibility and a strong balance sheet. Based on our scenario analysis and monitoring of signposts, we decide when we should act and which actions to take.

Proved Reserves

The mix and location of the resources in our portfolio demonstrate flexibility and the ability to adapt to change as we monitor scenarios and global trends. Our short-cycle project times and capital flexibility enable us to redirect capital to the most competitive basins. Our extensive low cost of supply resource base allows us to divest higher cost assets to high-grade our portfolio as our strategy evolves. This applies not only to hydrocarbon mix, but geographic region as well. If policy in a country or region significantly impacts cost of supply, we can shift capital to other opportunities. Examples include our presence in the oil sands business in Canada and in North American natural gas. Changing market fundamentals led us to significantly reduce our focus on both, while our portfolio diversity enabled expansion in other areas.
Capital and Operating Spend

Our strategy is also made more robust by discipline in capital and operating costs. When oil prices started dropping in 2014, we could respond with changes to short- and long-term planning, as well as more cost-effective and efficient operations.

Cost of Supply

Cost of supply is the West Texas Intermediate (WTI) equivalent price necessary to generate a 10% after-tax return on a point-forward and fully burdened basis, including cost of carbon where legislation exists. In our definition, cost of supply is fully burdened with exploration, midstream infrastructure, facilities cost, price-related inflation and foreign exchange impact, and both regional and corporate general and administrative costs. Cost of supply is the primary metric that we use for capital allocation, and it has the advantage of being independent of price forecasts. Any oil price above the cost of supply will generate an after-tax fully burdened return that is greater than 10%.

The cost of supply of our resource base supports our assertion that resources with the lowest cost of supply are most likely to be developed in scenarios with lower demand, such as the IEA’s Sustainable Development Scenario. In 2019, we had 15 billion barrels of resource below $40 per barrel diversified across four megatrends.
Decline Rate, Capital Intensity and Free Cash Flow

There are also a number of other key portfolio attributes that drive competitive advantage. The base decline rate is the rate at which producing wells at the end of any given year decline in production into the future. Our base decline rate is about 10% per year due to low-decline assets and a diverse portfolio. Capital intensity, which is driven by the base decline rate, is defined as capital expenditure divided by cash from operations. The three charts below demonstrate that low base decline results in a low capital intensity and produces a higher free cash flow yield compared to our peers, achieving a greater level of resiliency.

GHG Price

We use GHG pricing to navigate GHG regulations, change internal behavior, drive energy efficiency and low-carbon investment, and stress-test investments. The company uses a range of estimated future costs of GHG emissions for internal planning purposes, including an estimate of $40 per metric tonne applied beginning in the year 2024 as a sensitivity to evaluate certain future projects and opportunities. In accordance with SEC guidelines, the company does not use an estimated market cost of GHG emissions when assessing reserves in jurisdictions without existing GHG regulations.

Cost of Compliance with Carbon Legislation

<table>
<thead>
<tr>
<th>Climate Legislation</th>
<th>2019 Cost Of Compliance, Net Share Before Tax (US$ Approx)</th>
<th>Operations Subject To Legislation</th>
<th>Percent Of 2019 Production*</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Emissions Trading Scheme (EUETS)</td>
<td>$8 million</td>
<td>U.K., Norway</td>
<td>13</td>
</tr>
<tr>
<td>Alberta Carbon Competitiveness Incentive Regulation (CCIR)</td>
<td>$4 million</td>
<td>Canada</td>
<td>4</td>
</tr>
<tr>
<td>Norwegian carbon tax</td>
<td>$30 million</td>
<td>Norway</td>
<td>10</td>
</tr>
<tr>
<td>British Columbia and Alberta carbon tax</td>
<td>$0.8 million</td>
<td>Canada</td>
<td>5</td>
</tr>
</tbody>
</table>

*2019 country production over total production; cost of GHG emissions may only apply to some of our assets or to a portion of our emissions
GHG Emissions

Scope 1 and Scope 2 Emissions

Our scope 1 and scope 2 GHG emissions and emissions intensity calculations directly measure our climate performance and help us understand climate transition risk. For example, our ability to manage GHG emissions can help us measure resilience to emerging carbon tax regulation.

In 2019, our total gross operated GHG emissions, in CO2 equivalent terms, were approximately 20.5 million tonnes, a decrease of about 1.4% from 2018. The reduction was driven primarily by our UK asset disposition, downtime at Surmont due to a turnaround, and reduced production and LNG plant throughput at Darwin LNG. This was partly offset by increases from continued development in Lower 48 and increased flaring and LNG plant throughput at APLNG. Our overall GHG emissions intensity increased by 4.6% in 2019. Read more about our GHG emissions intensity target.

In accordance with our aim to improve the disclosure of risk to our stakeholders, we have integrated climate related Sustainability Accounting Standards Board (SASB) metrics into our 2019 performance metrics.
We report our operated emissions in the following regions, countries and provinces in accordance with regulation:

- **Indonesia**: Minister of Environment Regulation No. 12 of 2012 regarding Guideline for the Emission Load Calculation for Oil and Gas Industry Activities.
- **United States**: 40 CFR 98 Subparts C,PP, UU & W — Stationary Combustion Sources; Suppliers of CO₂; Injection of CO₂; Petroleum and Natural Gas Systems.

Our corporate reporting system uses the rules, emission factors and thresholds for regulatory emissions with the following amendments. We use a facility threshold for reporting of 25,000 tonnes per year increasing the corporate emissions reported for Alberta, Canada, which uses a regulatory threshold of 100,000 tonnes per year. In our corporate reporting system, we include scope 2 (emissions from imported electricity) which are not required under regulatory reporting.
**Scope 1** – Direct GHG emissions from sources owned or controlled by ConocoPhillips.

**Scope 2** – GHG emissions from the generation of purchased electricity consumed by ConocoPhillips.

**Scope 3** – All other indirect GHG emissions as a result of ConocoPhillips activities, from sources not owned or controlled by the company.

Read more about [GHG Protocol definitions](#).

### Scope 3 Emissions

For oil and natural gas exploration and production companies, scope 3 emissions fall primarily into the “use of sold products” category. Our GHG intensity target does not cover scope 3 emissions. As an exploration and production company with no downstream assets, we have no control over how the raw materials we produce are transformed into other products or consumed. We do, however, calculate our scope 3 emissions annually based on net equity production numbers. In 2019 our scope 3 emissions increased by 9%, primarily due to increased net production.

<table>
<thead>
<tr>
<th>Source</th>
<th>Estimated Million Tonnes CO₂e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream transportation and distribution</td>
<td>2.7</td>
</tr>
<tr>
<td>Downstream transportation and distribution</td>
<td>4.9</td>
</tr>
<tr>
<td>Processing of sold products</td>
<td>14.2</td>
</tr>
<tr>
<td>Use of sold products</td>
<td>173.4</td>
</tr>
</tbody>
</table>

Another issue with scope 3 emissions is that they are someone else’s scope 1 or 2 emissions. For example, the scope 3 emissions from refining the oil we produce are a refiner’s scope 1 emissions. The combustion of that oil in the form of a finished product such as gasoline are also scope 3 emissions for the producer of the oil, the refiner and the marketer. There is double counting throughout the economy. Likewise, our scope 3 combustion emissions for natural gas might be an electricity producer’s scope 1 emissions and our own scope 2 emissions. This is one of the reasons that to date, only integrated oil and gas companies have set scope 3 net-zero targets.

As an exploration and production company, we will concentrate on reducing the emissions that we own and control, and then advocate and help develop policy that impacts scope 3 emissions through a price on carbon. This is why we were a part of US Climate Action Partnership in 2007 and a founding member of the Climate Leadership Council in 2018.
Flaring

Flaring is a regulated and permitted process for the controlled release and burning of natural gas during oil and gas exploration, production and processing operations. Flaring is required to safely dispose of flammable gas released during process upsets or other unplanned events and to safely relieve pressure before performing equipment maintenance. Flaring is also used to control and reduce emissions of volatile organic compounds from oil and condensate storage tanks, and to manage emissions at well sites that lack sufficient pipeline infrastructure to capture gas for sale. We have reduced flaring by utilizing closed-loop completions, central gas gathering systems, vapor recovery units, directing condensate to sales pipelines and improving uptime through operational excellence (a major focus for all our operating facilities).

In 2019, our total volume of flared gas was 24.6 BCF, an increase of 13.8% from 2018. This was primarily related to gas infrastructure constraints for our Bakken asset as production growth exceeded midstream pipeline and processing capacity, resulting in excess gas being sent to flare rather than to sales. Part of the increase was also due to calculation methodology improvements by several assets in Lower 48. Flaring increases were partly offset by reductions at APLNG and the Bayu Undan field and our UK disposition.

Our Bakken team has identified several measures to reduce flaring, including working with our midstream partners to increase processing capacity and provide forecasts to improve their ability to plan. In the Permian, we have built and operate our own gathering system, which enables more flexibility and connections to multiple third-party processors. We have also developed and implemented facility design changes to reduce (or eliminate) flaring from tanks, and we utilize an internal decision tree to optimize our operations to reduce flaring during third party outages.
Methane and Fugitive Emissions

Managing emissions, particularly methane, is one of our key priorities. Reducing emissions, even the small equipment leaks known as fugitive emissions, is a key aspect of our Global Onshore Well Management Principles. While there are differing methods and many measurement points, estimates of natural gas leakage rates between gas processing plants and electric power plants vary widely, from 0.7 to 2.6%.

We have standard operating procedures to detect and repair leaks. Audio-visual-olfactory (AVO) inspections are routinely performed during operator rounds to identify any leaks or other issues. Leak detection and repair (LDAR) is a work practice used to identify and quickly repair leaking components, including valves, compressors, pumps, tanks and connectors, in order to reduce GHG emissions and increase efficiency.

At many of our locations, especially high rate producing wells and stand-alone compressor stations, we have a periodic voluntary fugitive monitoring program using forward-looking infrared (FLIR) cameras to enhance our LDAR. FLIR cameras create real-time images of gases or liquids leaking from pipes, vessels, tanks and other types of process equipment. FLIR surveys are completed at new or modified well sites, and subsequent monitoring surveys are conducted at least annually. We fix leaks as soon as feasible, with many leaks repaired either the same day or within a few days of being detected. If additional time is required, we follow standard maintenance processes by adding the required repairs to our maintenance tracking system. After repairs are completed, inspections ensure that the repairs are successful. We implement engineered solutions and/or operational changes if we identify developing trends of systemic hardware problems.

In 2019, methane emissions increased by 0.1 million tonnes of CO₂e due to increased development in our Lower 48 assets, increased flaring caused by gas infrastructure constraints for our Bakken asset as production growth exceeded midstream pipeline and processing capacity, and calculation methodology improvements.

Despite increased activity, we have maintained a low methane emission intensity rate. In 2019, the rate was 0.23% of natural gas production and 0.09% of total hydrocarbon production. Methane emissions reductions continue to be a key focus of our emissions reduction efforts.


**Energy Efficiency**

We continually strive to make our operations more energy efficient. This can provide an environmental benefit through reduced emissions, as well as an economic benefit through lower production costs or greater sales revenue. Through the natural decline of production, as our fields diminish in size, they tend to require either the same, or in some cases, even greater amounts of energy to extract the product and transport it for processing or refining. Newer operations tend to be more energy intensive as well.

Total energy consumption in 2019 was 225 trillion British Thermal Units (BTUs), a decrease of about 4.6%. The reduction was due to our UK disposition, a turnaround at Surmont and low production at Darwin LNG. This was partly offset by increased field gas compression for our Eagle Ford and Indonesia assets and increased production at APLNG. Approximately 98% of our consumption was from combustion of fuel for our own energy use with the remaining from purchased electricity.

**Low-Carbon Emitting Products**

In 2019, we supplied consumers with approximately 1 trillion cubic feet (or 2.8 billion cubic feet per day) of natural gas. To put this in perspective, if all the natural gas we produced in 2019 had been used to replace coal for electricity generation, GHG emissions would have been reduced by approximately 52 million metric tons, more than double the company’s combined scope 1 and scope 2 emissions for the year.

**CDP**

The annual CDP survey collects a wide range of information concerning corporate efforts to manage climate change issues effectively and drive emissions reductions. It includes an emphasis on governance, strategy, actions and reporting to try to provide a complete view of companies’ performance for comparison. It also provides a view of sector performance. ConocoPhillips has participated in the survey since 2003. Our most recent CDP submission can be found in the 2019 CDP document.

Read more about our Performance Metrics and SASB metrics.
GHG Emissions Intensity Target

We have a long-term target to reduce our GHG emissions intensity from five to 15% by 2030 from a Jan. 1, 2017 baseline. The target will support innovation on efficiency and emissions reduction, GHG regulatory risk mitigation and climate-related risk management throughout the lifecycles of our assets.

The target informs climate goals at the business level. Our performance will be based on gross operated GHG emissions, stated in carbon dioxide-equivalent terms, divided by our gross operated production, stated in barrels of oil equivalent. The target is set in relation to our scope 1 emissions and scope 2 gross operated emissions as these are the emissions over which we have the most control. The target covers all GHGs, but in practice will likely apply to carbon dioxide and methane emissions, as our emissions of other greenhouse gases are a small fraction of the total. For comparability purposes we exclude exploration and transportation services (i.e. Polar Tankers and Global Aviation) which are not directly related to oil or gas production from our emissions totals. This may give rise to small differences between the intensity we report for our GHG target purposes and the intensity we report in our annual Sustainability Report. Our current metrics also do not include the use of carbon offsets.

We report our progress against the target on an annual, calendar-year basis. Read more about our principles.

Target Implementation

In 2019, we completed our implementation plan to strengthen processes, tools and data required to support achievement of the target. This included:

- Validation of our baseline emissions to attempt to ensure an accurate and well-documented baseline.
- Continued collection and critical review of prospective emissions reduction projects through our marginal abatement cost curve (MACC) process to assess completeness of the project list.
- Business units developing fit-for-purpose plans that focus on further emissions reductions.
- The establishment of emissions-reduction steering groups in many business units to manage the planning process.
- Our North American business units collaborating to share knowledge about methane reduction projects.
- Continued engagement of our workforce to ensure broad alignment on target implementation.

Progress on target performance will be regularly reviewed by executive management and the board.

Target Progress

The 2017 sale of older assets in the U.S. and Canada reduced our GHG emissions intensity significantly. GHG emissions intensity increased in 2019 primarily due to an increase in drilling, production and flaring in the Lower 48 and the disposition of our U.K. business unit. Read more about our Total Flaring Volume.

While we have made strong progress in meeting the target during the first three years as we adjust our portfolio and use new technologies in our developments, we believe we will continue to need a long-term target range for several reasons. First, there are still 11 years before the target end date, and we would expect GHG intensity of our older
fields to increase. (As natural gas and oil fields deplete, more energy is required to produce the same or lower volumes, while newer fields utilizing modern technologies are likely to operate at lower intensities.) Second, some of our reported emissions are the result of applying standard emissions factors which may underestimate or overstate our actual emissions. We expect industry technologies around emissions reporting to advance over the next 11 years to more accurately reflect actual performance, which could also increase or decrease our intensity. Third, our portfolio will continue to change over time and, depending on the intensity of new production, our future intensity could increase or decrease. For example, part of the increase in intensity in 2019 was due to the full-year impact of the disposition of our U.K. business unit, which was comprised of lower-intensity offshore developments, while the full-year disposition of our higher intensity West Australia business unit will not be reflected until 2020.

As part of our efforts to continuously improve the quality of our environmental metrics data, in 2019 we honored our commitment to our emissions metrics procedures by working to improve our recording processes to facilitate more consistent and accurate recording and reporting of greenhouse gas emissions. We conducted an internal detailed review of our emissions inputs and accounting practices with one of our business units. As a result of the findings from this review, we updated our previously reported air emissions, greenhouse gas emissions and energy efficiency metrics for 2016, 2017 and 2018. This resulted in a revision of the company totals for these metrics by 1-3% of previously reported totals. This has resulted in small changes to the previously reported GHG intensities.

We built in a five-year review process, similar to what is proposed in the Paris Agreement. If our emissions projections appear to remain at the lower end of the target, we may adjust the target to a lower or smaller range in the future.

Reducing Emissions

Our 2019 gross operated global business-as-usual GHG emissions have been reduced by approximately 26% as a result of discretionary projects since 2009. We continued our voluntary emissions reduction program in 2019, with projects reducing GHG emissions in the U.S., Canada, and Norway.

In the U.S. we are participating in The Environmental Partnership, a coalition of over 80 natural gas and oil companies working to improve methane emissions management. As part of our commitment, our Lower 48 operations have focused on two key areas:
• Leak Detection and Repair (LDAR) programs — In 2019, we conducted more than 5,900 site surveys across our assets to detect leaks and quickly repair them. While this is a regulatory requirement in many areas, almost half the surveys were done voluntarily. These surveys continue to provide a better understanding of where leaks occur continuous site monitoring to reduce site emissions. Read more about our drone pilot project.

• Pneumatic device evaluation and conversion — All high-bleed pneumatic controllers have been removed or replaced. Many of our greenfield designs at new facilities include devices to use supplied air instead of site gas to reduce natural gas emissions from pneumatics.

In Canada, GHG reduction projects include:

• The installation of non-condensable gas co-injection in the oil sands to enhance production while reducing energy consumption and emissions. Read more about how we are reducing GHG emissions by over 20% while increasing production.

• The Carbon XPRIZE competition to research technologies to capture and transform CO₂. Read more about the global competition. (link to CCUS section)

In Norway, we worked with one of our offshore suppliers to install batteries on supply vessels to reduce CO₂ by 1,400 tonnes and nitrous oxide by 20 tonnes annually. Read more about the project.

Carbon Capture, Use & Sequestration

In the U.S. our operations at Buckeye East in New Mexico use recycled CO₂ for enhanced oil recovery, and in 2019 we purchased over 259,000 tonnes of CO₂ for injection. We are also a member of the Energy Advance Center (EAC), a voluntary association of energy and energy-related organizations dedicated to advancing the development and deployment of carbon capture, utilization and storage to achieve a cleaner energy profile and improve U.S. economic security. Our interest in EAC centers around advocating for a commercially reasonable standard to demonstrate secure geological storage in the context of captured carbon dioxide that gets sequestered underground as a tertiary injectant in enhanced oil recovery projects.

Seven of Canada’s Oil Sands Innovation Alliance (COSIA) member companies, led by ConocoPhillips Canada, partnered with NRG Energy, an integrated power company in the U.S., to back a global competition to research technologies to capture and transform CO₂. The NRG COSIA Carbon XPRIZE challenges the world to reimagine what can be done with CO₂ emissions by incentivizing and accelerating the development of technologies that convert CO₂ from fossil fuel combustion into valuable products. Ten teams from five countries were recently named finalists for the $20 million competition. Teams range from entrepreneurs and start-ups to academic institutions and companies that have been tackling the carbon challenge for more than a decade. The competition has two tracks: one focused on testing technologies at a coal-fired power plant and one at a natural gas-fired power plant. The 10 finalists received equal shares of a $5 million milestone prize to test their technologies at commercial scale under real-world conditions at the Integrated Test Center in Gillette, Wyoming for the coal track or at the Alberta Carbon Conversion Technology Centre in Calgary for the natural gas track. Teams will be scored on how much CO₂ they convert and the net value of their products. Ultimately, each of the two winning teams in the natural gas and coal tracks will be awarded a $7.5 million grand prize.
Water

Access to water is essential to the communities and ecosystems near our operations and for our ability to produce natural gas and oil. Water risks are evolving globally in response to cumulative effects of human water demand, physical effects of climate change and changing priorities and expectations of governments, investors and society. We measure and report on the volume of freshwater and non-freshwater withdrawn from local water sources and the volume of produced water that is reused, recycled, disposed or discharged after treatment. This data is used to estimate our water intensity and exposure to water stress. We also collect water forecast data for our Long-Range Plan which enables us to test our portfolio of projects against our water risks to make better-informed strategic decisions. Read more about our water management approach.

Water sourcing and produced water disposal for our unconventional assets continue to be priority risks for our business and stakeholders. While some water is required during drilling, the majority is used for fracking. Some wells can produce more water than natural gas or oil, and the relative volumes vary significantly with basin geology/hydrogeology.

- In the China Draw area of the Delaware Basin, where produced water is plentiful, we began using a centralized water gathering and distribution system in 2019. The system includes a produced water treatment facility, storage ponds for treated produced water and pipeline gathering, and distribution infrastructure. We have a target to use 98% recycled produced water for fracking in China Draw in 2020.
- In the Eagle Ford region of southern Texas, less water is produced with the natural gas and oil, so we utilize water from deeper, more brackish water sources that are not used for municipal, domestic or agricultural purposes. In 2019, we began using a pipeline system for central gathering and disposal of produced water for facilities in DeWitt County. That system will be expanded, and a similar central gathering and disposal system is expected to be completed for facilities in Karnes County in 2020. We have also developed a three-dimensional visualization tool, which provides a 3-D digital model of aquifers, water wells and natural gas and oil wells.
- For our Bakken operations in North Dakota, the majority of source water is transported using temporary, lay-flat pipelines from central storage ponds, and produced water is transferred to disposal wells using pipeline infrastructure.
- In the Montney basin in Canada, we completed water sourcing agreements with the Halfway River First Nation, secured a 20-year term water license and completed the installation of a centralized water gathering and distribution system in 2019. We have a target to recycle at least 80% of the produced water for fracking, with the remaining amount sourced from a local river.
The 2019 freshwater consumption intensity for our unconventional assets in the U.S. (Eagle Ford, Delaware and Bakken) and in Canada (Montney) is 0.27 BBL/BOE EUR. This is a 7% reduction compared to 2018 due to ramping up of produced water recycling in Delaware and the increased use of non-fresh groundwater sources in the Eagle Ford.

We use the World Resources Institute Aqueduct Risk Atlas (Aqueduct tool) to assess our portfolio exposure to water stress. Our Anadarko, Lost Cabin Gas Plant, Permian Basin Central Platform and Alaska Kuparuk assets are located in basins with high or extremely high baseline water stress and accounted for 8.4% of our total freshwater withdrawal in 2019.

Verification & Assurance

Each of our business units is responsible for quantifying emissions and reporting the information to our corporate center for compilation and internal verification. Reporting to authorities and regulators is also the responsibility of business units.

The method of data collection at each individual source ranges from continuous emissions monitoring to emissions estimations. Estimating approaches meet applicable regulatory reporting requirements or industry guidance, as appropriate. The quality of estimating methodologies, measurements and calculations are audited on a routine schedule by our corporate HSE auditing team and periodically assessed by third parties.

We conduct independent third-party limited assurance for scope 1, scope 2 and scope 3 emissions annually. The verification and assurance process for 2019 data will consist of independent third-party limited assurance of scope 1, scope 2 and scope 3 GHG emissions, as well as selected environmental and safety metrics including energy use, flaring, water use, criteria air pollutants, waste and liquid hydrocarbon spills. That assurance will be complete in fall 2020. See our most recent ERM CVS Assurance Statement.

Read more about our internal quality assurance and third-party verification.
External Collaboration

External engagement is important to understanding the issues and challenges relating to climate and the evolution of policy development.

Current actions include:

- Developing methane and shale development communications.
- Taking part in global legislation and regulation development.
- Engaging with stakeholders, including investors, on climate-related risks.

External Perspective

We are members or sponsors of a number of external groups that support our efforts to manage climate-related risks.

The API GHG Group addresses climate change issues affecting the U.S. oil and natural gas industry. The group oversees issues such as the development of the API Compendium methodology for estimating oil and gas industry greenhouse gas emissions and has recently taken part in the development of the overview of methodologies for estimating petroleum industry value chain greenhouse gas emissions. We are active in many API committees that can also involve or address climate-related issues, and we work to contribute our perspective in alignment with our positions and actions.

IPIECA established its Climate Change Working Group in 1988. Since then, the group has monitored the climate science and policy discussions, engaging with international governmental bodies and other stakeholders. It is not an advocacy body. It now also focuses on providing best practice guidance on GHG emissions monitoring, reporting and management to improve industry performance.

IPIECA participates in the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Framework Convention on Climate Change (UNFCCC), and provides IPIECA members with reliable and timely information about these and other international process dealing with climate change.

We are sponsors of the MIT — Joint Program on the Science and Policy of Global Change program which supports efforts to:

- Improve knowledge of interactions among human and natural Earth systems, with a focus on climate and energy, and of the forces that drive global change.
- Prepare quantitative analyses of global change risk and its social and environmental consequences.
• Provide independent assessments of potential responses to global risks, through emissions mitigation and anticipatory adaptation, contributing to improved understanding of these issues among other analysis groups, policymaking communities and the public.
• Augment the pool of people needed for work in this area by the education of graduate and undergraduate students in relevant disciplines of economic and Earth science analysis and methods of policy assessment.

An interdisciplinary team of natural scientists, social scientists and policy analysts supports this mission, with their efforts coordinated through the maintenance and application of a set of analytical frameworks that integrate the various components of global system change and potential policy response.

IHS Markit hosts forums where member companies can discuss global climate change and clean energy research and its implications for policy. They provide a wide range of research products to ensure that members are up to date with current developments around the world.

Additionally, we have worked with the following groups:

• International Oil and Gas Producers Association (IOGP)
• U.S. Business Council for Sustainable Development (USBCSD)
• Socially Responsible Investors (SRIs)
• Nongovernmental Organizations (NGOs)

We are a founding member of Canada’s Oil Sands Innovation Alliance (COSIA), a group of oil sands producers focused on accelerating the pace of improvement in environmental performance in Canada’s oil sands through collaborative action and innovation. COSIA member companies, led by ConocoPhillips Canada, partnered with NRG Energy, a leading integrated power company in the U.S., to establish a Carbon XPRIZE which challenges the world to reimagine what can be done with carbon dioxide (CO₂) emissions by incentivizing and accelerating the development of technologies that convert CO₂ from fossil fuel combustion into valuable products.
Public Policy Engagement

We believe that over the months and years ahead, governments — federal, state/provincial and local — will continue to act on climate-related risks. To succeed in a low-carbon economy, we must play a constructive role in public policy dialogue to devise practical, equitable and cost-effective approaches to reduce greenhouse gas (GHG) emissions and address climate-related risks.

Our Climate Change Position outlines our principles of effective climate change policy. These principles continue to guide our engagement on climate change policy in the United States, Canada, Europe, Australia and other countries in which we operate. We work with trade associations, industry peers and other key stakeholders to develop and use best practices and in efforts to align the policymaking process with our positions and principles.

Carbon Pricing Policy

We believe:

- The Paris Agreement and public opinion trends will yet lead governments around the world to regulate and price GHG emissions more stringently, and that our interests are best served by proactively engaging on climate-related policy.
- Climate-related policy action can support an orderly transition to a low-carbon economy, facilitate the development of carbon capture, use and storage, and reduce the overall risks associated with climate change.
- The most effective tool to reduce greenhouse gases across the economy is a well-designed price on carbon emissions.
- A revenue-neutral carbon tax that is transparent, predictable and cost effective to administer would be an effective policy option.
- Any carbon pricing mechanism should result in some relief via the elimination of other laws and regulations aimed at reducing or controlling carbon and other GHG emissions.
- Any proposed tax should be revenue-neutral and used in such a way as to minimize economic impact.
- The best way to regulate methane is through a price on carbon.
- In the absence of that carbon price in the U.S., the economy-wide direct regulation of methane would be effective. We support well-formulated federal regulation of methane emissions from oil and gas exploration and production if that regulation:
  - Encourages early adopters and voluntary efforts.
  - Incorporates cost-effective innovations in technology.
  - Supports appropriate state-level regulations.
We are a Founding Member of the Climate Leadership Council (CLC), an international policy institute founded in collaboration with business and environmental interests to promote a carbon dividends framework as the most cost-effective, equitable and politically-viable climate solution in the U.S. Participation in the CLC provides another opportunity for ongoing dialogue about carbon pricing and framing the issues in alignment with our principles. We also belong to and fund Americans For Carbon Dividends (AFCD), the education and advocacy branch of the CLC. We support and are advocating for a carbon price contingent upon four pillars - a gradually increasing carbon price, carbon dividends for all Americans, border carbon adjustments and regulatory simplification.

We have been actively engaged in climate-related discussions with policy makers and stakeholders since our first global climate change position was published in 2003. Since then, we have developed climate change action plans, set an emission intensity target, integrated carbon restricted scenarios into our strategic planning process and published carbon tax principles.

Global Principles for Country-Specific Carbon Tax Legislation

A well-designed carbon tax or other legislative proposal to fix and impose a price on carbon dioxide or other GHGs should meet the following principles:

- **Economy-wide** – Any carbon tax designed to fix and impose a price should apply as broadly across the economy as administratively practicable.

- **Non-discriminatory** – GHG emissions alone should form the basis of taxation. A carbon tax should not “pick winners and losers” among industries or emissions sources or discriminate in providing subsidies to energy sources.

- **Uniform** – The carbon tax should apply to all GHG emissions at the same rate on a “units of carbon dioxide equivalent” basis using the IPCC standard 100-year global warming potential.

- **Transparent** – In order to most efficiently incentivize changes to consumer behavior, the carbon tax should be imposed at the point in the value chain which is as close as administratively practical to the point and timing of the emission. If a point is chosen further upstream, a system of credits or other mechanisms should be designed to eliminate (or prevent) taxation of emissions applicable to taxable products sequestered downstream of the point of taxation and to those used as feedstocks for the manufacture of products in which GHGs are stored.

- **Avoid double taxation** – Any federal carbon tax should preempt state, provincial and local carbon taxes and renewable production tax credits.

- **Provide regulatory relief** – The federal carbon tax should replace all environmental laws and regulations that are intended to reduce or control carbon and other GHG emissions.

- **Predictable** – The application of the tax and the tax rate may be adjustable when necessary, but such adjustments should be infrequent and should be limited to those designed to achieve the broader environmental goal of the tax legislation.

- **Cost-effective administration** – Existing channels of tax collection and emissions reporting systems should be used if feasible. Where actual emissions cannot be measured, best efforts based upon sound science should be used as an estimate.

- **Globally competitive** – Any country-specific carbon tax rate should be set in accordance with existing taxation channels and emissions reporting systems and be adjusted to ensure global competitiveness. Depending on the point of taxation chosen, carbon tax legislation should include a border adjustment mechanism, or other attributes designed to mitigate competitive disadvantages to host country industry when competing in global markets.

- **Revenue recycling** – The tax should be revenue-neutral and used in such a way as to minimize economic impact.

- **Compliance flexibility** – Any federal carbon tax should include multiple options for compliance, including offset credits from a broad range of jurisdictions, cash payments or flexible compliance frequency.
Climate Change Policy — Our History

Our approach to public policy engagement on climate change has evolved. However, we remain consistent in our view that market-based solutions at national and global levels, rather than a patchwork of less effective regulatory approaches, are most likely to be effective in reducing GHG emissions.

Shortly after the merger of Conoco and Phillips Petroleum in 2003, we published our first global climate change position. Since then, we have consistently used our Sustainability Report to detail our commitments, priorities and actions. We also first participated in the Carbon Disclosure Project (now CDP) questionnaire in 2003.

Historical Engagement

In 2004, we described actions that we would be taking to address climate change, including:

- Assessing data.
- Developing objectives to reduce GHG emissions.
- Improving operational efficiency.
- Developing climate change considerations for project planning and approval processes.
- Engaging in discussions on climate change through the International Petroleum Industry Environmental Conservation Association (now IPIECA).
- Joining the International Emissions Trading Association (IETA).

In 2005, we began trading in the European Union ETS.

Through our membership in the U.S. Climate Action Partnership (USCAP) beginning in 2007, we actively participated in efforts to design an effective legislative approach.

In 2008, we adopted and published our first Climate Change Action Plan to systematically address climate change risk.

In June 2009, the American Clean Energy and Security Act of 2009 (HR2454) (Waxman-Markey) bill passed the House of Representatives. Although the USCAP Blueprint for Legislative Action was considered influential in the design of the legislation, we had serious concerns about some of the detailed elements in the bill. Following passage of the House bill, our focus turned to addressing issues of concern in the Senate version of the legislation. In order to intensify our company’s focus and resources on addressing the key issues, including the important role that natural gas can play in reducing U.S. GHG emissions, we announced in February 2010 that the company would not be renewing our membership in USCAP.

Through this more direct engagement, we were successful in helping to develop draft legislation that incorporated a more equitable approach to energy sectors while maintaining environmental effectiveness. We issued a statement regarding the draft legislation introduced in the Senate in May 2010.

Since 2010, we’ve continued to work toward approaches that are practical and effective, including active participation in dialogue with trade associations like the American Petroleum Institute (API), industry partners and the government to advocate smart policy solutions.
Recent regulatory engagement

Collaborating with a broad range of stakeholders on effective climate change policy and GHG emissions solutions is key to solving the climate change challenge.

In 2014, we publicly supported the Gas Capture Plan in North Dakota, now required, which took a pro-active approach to flare gas reduction. We entered into agreements with pipeline companies to ensure that required gathering infrastructure was available when needed in order to reduce emissions.

In 2016, we supported the U.S. Bureau of Land Management Onshore Order 1, electronic filings, as the proposed changes reduced work and errors and sped up response time for both industry and the government.

In 2016, the U.S. Bureau of Land Management (BLM) proposed a series of Onshore Orders. After careful review, ConocoPhillips opposed Onshore Order 9, the proposed Venting and Flaring rule, based on the conclusion that the BLM was overreaching their authority and the proposal created a duplication of federal authority with EPA. Our comments to the BLM included suggestions to remove many of the duplicative requirements. While we opposed many of the requirements in Onshore Order 9, we did suggest some changes to certain proposed requirements. For example, we agreed that the limits for royalty-free flaring should be changed and gave recommendations for the limits.

Since 2018, we have been a member of the Energy Advance Center (EAC), a voluntary association of energy and energy-related organizations dedicated to advancing the development and deployment of carbon capture, utilization and storage to achieve a cleaner energy profile and improve U.S. economic security. In 2018, Congress passed the Furthering Carbon Capture, Utilization, Technology, Underground Storage, and Reduced Emissions Act to enhance the 45Q tax credit to further incentivize carbon capture and storage technology deployment in the United States. The primary issue with the 45Q tax credit is the interpretation of what constitutes secure geological storage (SGS). In particular, we support the adoption of a commercially reasonable ISO standard to demonstrate secure geological storage in the context of captured carbon dioxide that gets sequestered underground for enhanced oil recovery projects. The standard should establish criteria for transparency and assurance that carbon dioxide removal is achieved. We also support self-veriﬁcation of compliance with the ISO standard given that our tax ofﬁcer would attest to satisfying the requirements of 45Q under penalties of perjury.

Recent legislative engagement

In 2019, we worked within the broad coalition of Climate Leadership Council members to better define details of the overarching implementation plan. That included work on topics such as carbon price escalation rates, points of taxation, regulatory backstop provisions, high energy-cost region challenges and a border carbon adjustment. While the policy work continues with CLC members, the results of that engagement are reﬂected in the more detailed CLC plan released in early 2020. We also engaged with members of congress directly and through Americans For Carbon Dividends. This included reviewing several proposed climate bills and continuing to offer technical feedback on those bills to elected representatives and their staff. The company remains engaged with representatives from both sides of the political spectrum.

In 2014, both the oil industry and environmental leaders in Alberta, Canada, realized they were at an impasse as public dialogue on the oil sands, pipelines and climate change had descended into a polarized debate. The provincial government wanted help to achieve their climate change policy commitments, and industry and environmental organizations realized it was time to try something different: to participate in a provincial climate policy that would recognize the importance of industry competitiveness. The groups were able to work together and agree on recommendations that the Alberta government included in its Climate Leadership Plan.
One element of the Climate Leadership Plan is the Emissions Limit for oil sands. In 2016, through our progressive work with leading environmental groups in Canada, we secured a seat on the Oil Sands Advisory Group (OSAG), one of only seven industry seats. Designed to advise the government on the implementation of the limit and other oil sands environmental issues, the OSAG includes members from industry, environmental organizations, and indigenous and non-indigenous peoples. The primary focus of the group is to consider how to implement the 100 million tonnes of CO$_2$ equivalent per year GHG emissions limit for the oil sands industry.

**Paris Agreement on Climate Change**

At the COP-21 meeting in Paris in 2015, almost 200 countries agreed on a new global emission reduction framework starting in 2020. In 2017, President Trump announced that the U.S. would withdraw from the agreement. Prior to this announcement, we took actions to advocate for the U.S. to stay in the agreement. ConocoPhillips Chairman and CEO Ryan Lance publicly expressed his view that it was good for the U.S. to remain in the agreement. During meetings with White House energy advisors on the National Economic Council and National Security Council staff, ConocoPhillips Government Affairs and Executive Leadership Team members advocated that the U.S. should continue to participate in the agreement because:

- It gives the U.S. the opportunity to participate in future climate policy discussions to safeguard its economic and environmental best interests as the Paris Agreement is being implemented globally.
- It provides an opportunity for the U.S. to encourage other nations to incorporate technology development as a means of lowering emissions from fossil fuels into their commitments under the agreement.
- Switching to natural gas power is already occurring in the U.S., driving economic development and GHG reductions.
- Withdrawing from the agreement could energize political action by domestic opponents of U.S. energy development.

We will continue to work to address climate change concerns by supporting effective, fit-for-purpose solutions that link to binding international agreements. We will also work to reduce emissions associated with our operations while ensuring the continued supply of affordable, reliable energy necessary for economic growth.
Climate Change Position

ConocoPhillips recognizes that human activity, including the burning of fossil fuels, is contributing to increased concentrations of greenhouse gases (GHG) in the atmosphere that can lead to adverse changes in global climate.

Our Focus

While uncertainties remain, we continue to manage greenhouse gas emissions in our operations and to integrate climate change related activities and goals into our business planning. Our corporate action plan focuses on the following areas:

- Understanding our GHG footprint
- Reducing our GHG emissions
- Evaluating climate change related risks
- Leveraging technology innovation to explore new business opportunities
- Engaging externally in support of practical, sustainable climate change solutions
- Reviewing progress and updating business unit climate change management plans

Our approach to climate change is designed to advance the company’s vision to be the exploration and production company of choice for all stakeholders by pioneering a new standard of excellence.

Climate Change Public Policy

We believe that effective climate change policy must be aligned with the following principles:

- Recognize that climate change is a global issue which requires global solutions — economy-wide governmental GHG management frameworks should be linked to binding international agreements comprising the major GHG contributors
- Result in the stabilization of global GHG atmospheric concentrations at safe levels
- Coordinate with energy policy to ensure a diverse and secure supply of affordable energy
- Utilize market-based mechanisms rather than technology mandates
- Create a level competitive playing field among energy sources and between countries
- Avoid overlapping or duplicating existing energy and climate change programs
- Provide long-term certainty for investment decisions
- Promote government and private sector investment in energy research and development
- Match the pace at which new technology can be developed and deployed
- Encourage efficient use of energy
- Foster resiliency to the impacts of a changing climate
- Avoid undue harm to the economy

Building balanced energy policies is challenging, and we recognize that no one has all the answers. As economies around the world continue to develop, fossil fuels will play an important role in meeting the growing global demand for energy. Meeting the challenge of taking action on climate change while providing adequate, affordable supplies of reliable energy will require financial investments, skilled people, technical innovation and responsible stewardship from policy makers, energy producers and consumers. We are committed to doing our part.
Managing methane, which is the primary component of natural gas, and reducing even small releases of methane from operating components, is a key aspect of our Global Well Management Principles. Quickly detecting and repairing leaks is also an important element as we work to achieve our greenhouse gas (GHG) emissions intensity reduction target. Drones are the latest technology being piloted in our arsenal of leak detection and repair (LDAR) tools, providing real-time identification of leaks and accurate quantification of leaks and process equipment emissions. Drone-based methane monitoring programs have the potential to help our entire industry reduce emissions by providing a better understanding of where leaks occur and at what magnitude. This technology advancement quantifies emissions and allows us to benchmark sites and establish a baseline for reduction efforts.

“By testing this technology, we are seeing the possibility of both detecting and quantifying methane emission rates coming from individual oil and gas production sites. Understanding the quantity of methane, and not just the presence of the gas, could help direct more efficient and effective maintenance activities in the future,” said David Camille, Manager, Lower 48 HSE Innovation & Technology.

The project is a collaboration with Scientific Aviation, a company well-known for its expertise in using manned aircraft to detect and quantify methane emissions. The effort began after ConocoPhillips expressed interest in improving the precision of emissions quantification rates coming from sites by scaling Scientific Aviation's manned aircraft technology to drones. Airplanes fly loops around the area being assessed but are limited to collecting data from a broad area. In dense fields with multiple potential emission sources, data from manned aircraft does not provide the granularity needed to easily identify emission sources or quantify emissions from an individual site. Airplanes can identify a leak source within a range of about 500 meters.

Field Testing the Technology

Texas’s Eagle Ford was the first location to test the drone system technology at an operating well site. The area was selected because it is relatively flat and has steady wind conditions. Drones began collecting data in early 2019 and, for comparison purposes, tests were also conducted using a manned aircraft and optical gas imaging camera.

The drone system is outfitted with on-board gas analyzers and meteorological sensors, which provide data to the operator while being flown around well sites. By executing a flight pattern that creates a virtual plane downwind of equipment, the technology identifies the total amount of methane being emitted from site. The system does this by detecting methane passing through the virtual plane and capturing wind vector in real time. These variables are then fed into sophisticated algorithms to quantify methane volumes.

Flying the drone closer to the equipment allows for isolation and confirmation of the source. Since the drones are much smaller than aircraft, they fly at much lower altitudes and are able to more precisely pinpoint the location of leaks by using the data collected paired with visual information from the on-board video feed.
“The ability to fly nearer to sources, combined with the wind and methane measurement, allows us to locate the source of a leak to within a few meters,” Camille noted. Additionally, tests indicate that the drone system has the potential to detect smaller leaks that are difficult to detect by planes or on-the-ground methods.

See more about how we are testing drone technology.

Once leaks are identified, they are fixed as soon as feasible, with many leaks repaired either the same day or within a few days of being detected. If additional time is required, we follow standard maintenance processes by adding the required repairs to our maintenance tracking system. After repairs are completed, inspections ensure that the repairs are successful. We implement engineered solutions and/or operational changes if we identify developing trends of systemic hardware problems.

Current Regulations

The current U.S. regulatory framework allows operators to use optical gas imaging cameras or point source air sampling to detect leaks from oil and gas operations. Quantification normally relies on equipment counts and Environmental Protection Agency (EPA) equipment factors that estimate emissions for each piece of equipment. Early measurement results by the drone system suggest that facilities with gas-driven pneumatic controllers emit much less than what is currently reported under the EPA factors.

Use of unmanned aerial systems for emission detection generally has been limited due to regulatory frameworks, quantification techniques and big data capabilities. We see potential for change in several of these areas and are proactively evaluating and further developing various technologies. Data obtained by the drone system allows for benchmarking and continuous improvement, while supporting future regulatory conversations related to leak detection, repair and quantification.

Next Steps

We are continuing to test the drone technology in other areas of our operations to evaluate the consistency of findings across various operating conditions.

“Next, we will work closely with our operations teams to identify and document best practices for emissions detection via drone in parallel with developing and testing a number of technical enhancements to improve the performance of the technology,” said Amanda Morris, ConocoPhillips director of Technology Commercialization.

“Since methane emissions are a global issue, using and testing this technology at more of our assets has the potential to help reduce methane emissions at a faster and larger scale.”

1 Due to constraints on capital in 2020 and beyond, any future plans for testing technology may be curtailed.
Reducing greenhouse gas (GHG) emissions associated with our operations is an important part of our long-term corporate goals and often also yields economic benefits. Managing methane, which is the primary component of natural gas, is one of our key priorities and reducing even the smallest releases of methane from operating components is a key aspect of our Global Well Management Principles. In the liquids rich area of Montney, an unconventional resource basin located in northeast British Columbia, Canada, we designed a way to eliminate the majority of methane emissions by relying on air, rather than natural gas, to drive our equipment.

The Montney development is well-suited for a system that uses air due to the proximity of well pads to the central processing facility, which makes it economic and more efficient to run the air-driven equipment. However, the challenge was generating our own power to run the system onsite.

"The innovative design of the central processing facility relies on natural gas turbines to generate the electricity required to compress the air to operate valves and small pumps. Older plants and other remote facilities typically use process gas for the instruments, which requires venting, so we’re decreasing emissions by using air. It’s also safer for operations since you’re eliminating gas vapors from the enclosed space of the plant,” said Dave Strathdee, Montney plant engineer.
The British Columbia government is promoting hydroelectrical power as part of its GHG reduction strategy and is providing incentives for electrifying equipment.

“Other operators in the Montney area are close to the grid so it has been relatively simple for them to electrify. As the region develops, hydroelectricity power could reach our development in the mid-2020s, so going electric now means we could consider connecting into the grid at a later date. With hydropower having zero emissions, this would further reduce our environmental footprint significantly,” said Julie Dalzell, ConocoPhillips Senior Climate Change Advisor.

ConocoPhillips Canada received a $4.5 million royalty credit in 2018 from the British Columbia government for the methane-reducing plant design under the CleanBC plan. New regulations in Canada will require newly built facilities to use zero emission equipment and instruments by 2023, part of the government initiative targeting a 45% emissions reduction from the oil and gas sector. Operating Montney with an instrument air system, in lieu of natural gas, is also estimated to reduce carbon taxes.

“We didn’t know what the exact regulations would be when we were designing the facility but knew the focus would be on methane reductions and an increased scrutiny on methane emissions. Now we are in a great place to comply with the regulations,” Dalzell added.

The effort also supports our company-wide, long-term target to reduce our GHG emissions intensity between 5% and 15% by 2030. As a result of using air to power operations, early indications are that Montney may be one of lowest GHG intensity projects in the ConocoPhillips portfolio.
The installation of a new offshore power cable from the Eldfisk Complex to the Eldfisk Bravo platform in the Norwegian North Sea in 2019 was the final step in integrating the power grid serving the Greater Ekofisk Area. The effort replaces power from diesel generators with surplus capacity electricity from existing low nitrous oxide (NOx) generators at the Ekofisk Complex and the steam generator at Eldfisk 2/7 E.

The 3.73 mile (6 kilometer) cable provides electricity to support both day-to-day and drilling operations and was installed along existing water and gas pipelines. The fiber optics within the cable replaced the old radio link communication to the Complex and has opened the door for possible future remote operations of Bravo.

Replacing the diesel generators will result in reductions in our NOx and carbon dioxide (CO₂) emissions, reduced noise levels and less exposure to exhaust gas by workers. The project could yield annual emission reductions of as much as 165 tonnes of NOx and up to 1,000 tonnes of CO₂ emissions. Improved production reliability is also expected, as well as reduced operating and maintenance costs. Two diesel generators will be retained as backup generators in the event of a power failure in critical phases of future drilling activities.

Norway’s NOx Fund allocated 73 million kroner (about $8.2 million) in investment assistance based on this estimated NOx reduction, funding approximately 36% of project cost.

The Greater Ekofisk Area, located approximately 300 kilometers (200 miles) offshore Stavanger, is comprised of four producing fields: Ekofisk, Eldfisk, Embla and Tor. Crude oil from Greater Ekofisk’s producing fields is exported via pipeline to Teesside, England, and natural gas flows via pipeline to Emden, Germany.