Climate-Related Risks and Opportunities:
Positioning for a Low-Carbon Economy
Occidental is an international oil and gas exploration and production company with operations in the United States, Middle East and Latin America. Headquartered in Houston, Occidental is one of the largest U.S. oil and gas companies based on equity market capitalization. Occidental’s midstream and marketing segment purchases, markets, gathers, processes, transports and stores hydrocarbons and other commodities. Occidental’s wholly owned subsidiary, OxyChem, is a major North American chemical manufacturer.

Founded in 1920, Occidental’s success is built on technical expertise, business acumen, strong partnerships and our proven ability to deliver results.

At Occidental, social responsibility is fundamental to our success and reputation as a respected Partner of Choice®. We are committed to conducting our business in a manner that safeguards our employees, protects the environment, benefits neighboring communities and strengthens local economies.

About this Report

This report highlights our recent efforts to address climate-related risks and opportunities in our business. The report begins with an introductory letter from our President and CEO, highlighting some of our climate-related leadership and action in 2018 and 2019, including how we are exploring our carbon-neutral aspiration. We then provide an overview of progress on our 2018 commitments, climate-related governance and risk management processes and systems, planning and execution of climate strategies, and metrics and targets for reducing greenhouse gas (GHG) emissions. This report is organized in the four-element framework recommended by the Task Force on Climate-related Financial Disclosures (TCFD)1, a framework we support.

This report was prepared in 2019, and the results of the scenario analysis detailed in this report are based on specific assumptions and estimates. Given the inherent uncertainty in predicting and modeling future conditions, caution should be exercised when interpreting the information provided. The results are not indicative of, and this report does not represent, a preferred or expected outcome of the future.

1 The TCFD — established by the Financial Stability Board in response to a request from the G20 Finance Ministers and Central Bank Governors — developed a voluntary disclosure framework for climate-related financial disclosures. The framework is organized around four themes: Governance, Strategy, Risk Management and Metrics and Targets. See https://www.fsb-tcfd.org/
Cautionary Statement Regarding Forward-Looking Statements

This report contains forward-looking statements within the meaning of the Securities Act of 1933 and of the Securities Exchange Act of 1934. These forward-looking statements are based on management's current expectations relating to Occidental's operations and business prospects. Words such as "estimate," "project," "predict," "will," "would," "should," "could," "may," "might," "anticipate," "plan," "seek," "intend," "believe," "expect," "aim," "goal," "target," "objective," "likely" or similar expressions that convey the prospective nature of events or outcomes generally indicate forward-looking statements. You should not place undue reliance on these forward-looking statements, which speak only as of the date of this report. Actual results may differ from anticipated results, sometimes materially, 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: global commodity pricing fluctuations; changes in supply and demand for Occidental's products; higher-than-expected costs; the regulatory approval environment; not successfully completing, or any material delay of, field developments, expansion projects, capital expenditures, efficiency projects, acquisitions or dispositions; technological developments; uncertainties about the estimated quantities of oil and natural gas reserves; lower-than-expected production from operations, development projects or acquisitions; exploration risks; general economic slowdowns domestically or internationally; political conditions and events; liability under environmental regulations including remedial actions; litigation; disruption or interruption of production or manufacturing or facility damage due to accidents, chemical releases, labor unrest, weather, natural disasters, cyber attacks or insurgent activity; failures in risk management; and the factors set forth in Part I, Item 1A “Risk Factors” of the Form 10-K for the fiscal year ended December 31, 2018 (2018 Form 10-K) and in Occidental's other filings with the U.S. Securities and Exchange Commission (“SEC”). Unless legally required, Occidental does not undertake any obligation to update any forward-looking statements, as a result of new information, future events or otherwise. The Sustainable Development Scenario modeled in this report is derived from assumptions contained in the International Energy Agency’s 2018 World Energy Outlook. The scenario is not a forecast or prediction of the future. There can be no assurance that the scenario modeling or assessment presented in this report are reliable indicators of the actual impact of climate change on Occidental’s asset portfolio or business. Statistics and metrics included in this report are estimates and may be based on assumptions or developing standards.

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. Any reserve estimate provided in this presentation that are not specifically designated as being estimates of proved reserves may include "potential" reserves or other estimated reserves not necessarily calculated in accordance with, or contemplated by, the SEC’s latest reserve reporting guidelines.

Table of Contents

1. CEO Letter 7
2. Exploring Carbon Neutral Pathways 11
3. Progress on 2018 Commitments 15
4. Governance 19
   i. Board Oversight of Climate Risk 21
   ii. Engagement 23
5. Risk Management: Integrating Climate 27
   i. Risk Identification and Management Processes 29
   ii. Carbon Price Assumptions 29
   iii. Portfolio Review Process and Results 29
   iv. Physical Risk Resilience 32
6. Our Strategy for Resilience and Opportunity 33
   i. Carbon Capture and Enhanced Oil Recovery Leadership 35
   ii. Oxy Low Carbon Ventures 37
   iii. Low-Carbon Natural Gas Opportunities 45
   iv. Industry Leadership: Oil and Gas Climate Initiative 48
   v. Efforts to Reduce Direct Emissions 48
   vi. Reduction of Indirect Emissions: Efficient Energy Generation and Use 52
7. Metrics, Targets and Next Steps 57
8. Glossary 65
2018 was a significant year for Occidental. In addition to strong financial performance, we took an industry leadership role and initiated several new actions to leverage our expertise in carbon capture, utilization and sequestration (CCUS) technologies with the goal of benefiting our business and the Earth's climate.

We were one of the first U.S. companies to join the Oil and Gas Climate Initiative (OGCI), a CEO-led effort by the world’s most influential energy companies. OGCI aims to reduce the industry’s carbon footprint and invest in economically viable low-carbon technologies that will lead the way for tomorrow’s new energy landscape. Working with the Carbon Capture Coalition and others, we helped pass the FUTURE Act, which incentivizes CCUS. We continue to partner with these groups to advance legislative support for CCUS research, development and deployment.

We launched Oxy Low Carbon Ventures (OLCV), a wholly owned subsidiary dedicated to advancing leading-edge, low-carbon technology solutions that will grow our business while reducing emissions. OLCV is focused on securing new sources of man-made carbon dioxide (CO₂) for use in global oil and gas projects and is investing in technologies that have the potential to make a significant contribution to decreasing greenhouse gas emissions.

Simultaneously, we made progress on our ongoing efforts to reduce emissions in our global operations. In the Permian Basin, two recent projects illustrate this commitment: Aventine, a first-of-its-kind logistics hub, has reduced truck mileage by 1.5 million miles; and a new 120-acre solar field that, once complete, will provide 16 megawatts of power to one of our operations units. In the Middle East, we are conducting an engineering study to build a two-gigawatt solar steam generating facility that could save more than 725,000 tons of CO₂ emissions per year.

We believe we are well positioned for success in a low-carbon economy with our comprehensive strategy that includes flexible, low-cost assets, an advantageous mix of long- and short-cycle projects, and our unique expertise in combining carbon capture and enhanced oil recovery.
I want to highlight these key takeaways from this year’s report:

We have analyzed our portfolio using the International Energy Agency’s 2018 Sustainable Development Scenario, and this analysis demonstrated no significant risk of stranded assets.

We have achieved or made significant progress toward the commitments we made in our 2018 climate report.

We have developed indicators for CO₂e emissions intensity and methane emissions intensity, and have committed to set and disclose targets by the end of 2019.

We have expanded the sustainability component of the annual cash incentive award in our executive compensation program and established quantitative targets tied to the advancement of CCUS.

Our Board possesses a valuable collective competency on climate and sustainability, reflecting diverse experience and perspectives. Working together, management and the Board understand that climate issues, like other business concerns, continuously evolve. We remain committed to transparency and continuing a dialogue with our stakeholders.

Over the past year, I have spoken to global audiences about Occidental’s commitment to leverage our Industry-leading skills and assets to expand the use of CCUS globally, with a long-term aspiration of carbon neutrality. We have charged the OLCV team with seeking opportunities to innovatively reduce the carbon footprint of our and others’ operations in ways that sustain and expand our business. These capabilities uniquely position us to succeed in our changing world.

Vicki Hollub
President and Chief Executive Officer

May 2019
Exploring Carbon Neutral Pathways
Occidental is committed to significantly reducing and offsetting its total carbon impact, including carbon from products we sell. We are exploring multiple options that can contribute meaningfully to our aspiration of carbon neutrality across our oil and gas value chain. The figure below identifies potential key drivers of a pathway to reducing Occidental’s total carbon impact.

Investments in key drivers will be made across the spectrum. These include addressing conventional emissions such as direct, indirect and product-related emissions totals (Scopes 1, 2 and 3), as well as investments related to CCUS, carbon-reduction technology deployment and reductions by third-party partners where Occidental’s technical services and know-how leads to a reduced greenhouse gas footprint.

The Total Carbon Impact figure depicts a pathway and potential relative magnitude of CO₂ reductions by key driver. The portfolio represents the opportunity set we intend to examine — and where we intend to invest — in pursuit of Occidental’s carbon neutrality aspiration. The most significant near-term option, which is unique to Occidental’s core business, is CCUS. Within this pathway, Occidental is pursuing projects to obtain CO₂ through direct air capture and by capturing emissions from third-party sources. In the near-term, the focus will be safe sequestration of CO₂ while growing our EOR business. In the longer-term, we expect to expand the commercial use cases for CO₂ within our portfolio.

In support of our business goals and our carbon neutrality aspiration, we are developing a methodology to ensure transparency and robust measurement of our total carbon impact. Reductions that Occidental implements within its operational control, as well as those where we partner to achieve reductions, will be netted against our Scope 1-3 emissions. We believe this expansion of carbon measurement methodologies beyond the boundaries of traditional greenhouse gas accounting conventions is necessary to capture the variety of opportunities — such as avoided emissions, low-emission products and the withdrawal of CO₂ from the atmosphere — where multiple parties have significant roles to play. Ultimately, if society is to achieve a well-below 2°C outcome, the contributions of those that facilitate emissions reductions or withdrawals of CO₂ from the atmosphere should be recognized in a transparent way that further encourages similar actions.

Carbon Capture Offsets
Occidental will generate direct offsets towards Scope 1, 2 and 3 emissions by capturing emissions from Occidental’s operations and third parties

Technologies and Partnerships
Occidental will generate indirect offsets by investing in technology and partnering with others to deploy low-carbon solutions

The Benefits of CCUS Via CO₂ EOR Total Carbon Impact

When utilizing the CO₂ EOR production process, the quantity of anthropogenic CO₂ permanently sequestered in the reservoir has the potential to exceed the amount associated with the production process plus the amount emitted when each barrel of oil is used as transportation fuel.

1 Based on Occidental’s Permian EOR operating experience
Progress on 2018 Commitments
Progress on 2018 Commitments

In our report last year, we made several commitments to create or enhance climate-related processes or metrics. The following chart summarizes our progress toward fulfilling each commitment.

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<th>Commitment</th>
<th>Actions</th>
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<tr>
<td>Regularly evaluate our strategy with Board oversight under various low-carbon scenarios.</td>
<td>Business strategy updates occur during each Board meeting with an annual deep dive that includes opportunities and risks of a low-carbon economy.</td>
<td>Develop a new metric for CO₂e emissions.</td>
<td>In addition to absolute equity-adjusted emissions (Scope 1 and Scope 2) for Occidental-operated assets, oil and gas direct emissions are tracked on an intensity basis, (tonnes CO₂e per barrel of oil equivalent (BOE) produced).</td>
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<tr>
<td>The Board is committed to active and participatory shareholder engagement, as well as increasing our company’s acumen on climate-related risks and opportunities.</td>
<td>Board members participate in off-season ESG engagement. Board knowledge about climate-related risks and opportunities is enhanced through strategy sessions and Climate Report review process.</td>
<td>Develop a new metric for methane emissions.</td>
<td>Oil and gas methane emissions are tracked on an intensity basis, (tonnes CH₄ per BOE produced). Also, we are supporting the OGCI methane intensity goal.</td>
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<td>Provide update on our climate risk management and planning.</td>
<td>This report contains the results of an updated risk assessment with new IEA assumptions for the Sustainable Development Scenario. Also, this topic was discussed with investors and ESG groups during off-season engagement.</td>
<td>Develop field-by-field CO₂e emission-intensity.</td>
<td>Country-level intensities have been developed and are used in the reserves portfolio analysis. We intend to continue to refine the field-by-field estimates.</td>
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<tr>
<td>Model carbon prices and related financial impacts in capital spending plans for major projects.</td>
<td>A sensitivity analysis using a carbon price of $50 per metric ton is done for all projects above $5 million (increased from $40 per metric ton in 2018).</td>
<td>End routine gas flaring by 2030.</td>
<td>We are developing an approach with interim milestones. Currently, we report CO₂e from flared volumes in the Social Responsibility section of Occidental’s company website [<a href="http://www.oxy.com">www.oxy.com</a>].</td>
</tr>
<tr>
<td>Develop models of the potential upside for Occidental’s CO₂ EOR business.</td>
<td>These models were developed and are being used in our strategic planning.</td>
<td>Report annually on our progress on commitments made to API Environmental Partnership.</td>
<td>We met our 2018 voluntary commitment for leak detection and repair surveys in Occidental’s U.S. oil and gas operations.</td>
</tr>
<tr>
<td>Add an executive compensation metric related to the advancement of CCUS.</td>
<td>A component has been included in executive compensation plan.</td>
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Governance
Governance

The Board of Directors, its committees and members of senior management work together to implement and promote effective corporate governance. One of the Board’s principal governance functions is to oversee Occidental’s policies and procedures with respect to managing risks to our business. The Board’s risk oversight structure with respect to environmental, social and governance (ESG) and sustainability matters — including climate — is explained below.

The Board is committed to achieving a diverse and broadly inclusive membership. The Board believes that diversity of thought, background and experience, as well as gender and ethnicity, meaningfully contribute to the Board’s oversight of ESG and sustainability issues, including climate-related risks and opportunities. Our directors have a wide range of backgrounds and experiences, including in government service, non-governmental organizations and a variety of industries in the private sector. Four of our 11 directors are diverse based on gender and ethnicity. In addition, our Board includes several directors who bring unique expertise and perspective to ESG and sustainability issues.

Finally, the Board is led by an independent chairman who, among other responsibilities, coordinates and approves all meeting agendas and serves as liaison between the Board and Occidental’s stockholders.

Board Oversight of Climate Risk

As with many enterprise-level risks and strategic issues, certain aspects of the oversight of climate risks and opportunities have relevance to each of the committees of the Board.

Environmental, Health and Safety Committee (Environmental Committee)

Pursuant to its charter, this committee reviews climate-related risks and opportunities as part of our risk management processes.

Corporate Governance, Nominating and Social Responsibility Committee

Pursuant to its charter, this committee oversees stockholder engagement and disclosures regarding ESG and sustainability matters.

Audit Committee

Oversees our Enterprise Risk Management (ERM) process, which involves a cross-functional ERM team that reports to our ERM Council, a group of senior executives collectively responsible for policies and procedures involved in measuring, monitoring, managing and reporting enterprise risks, including climate risk.

Executive Compensation Committee

Influences management priorities by establishing the parameters and goals that determine executive compensation. For many years, Occidental’s executive compensation program has included elements related to sustainability. For 2019, the Compensation Committee enhanced the sustainability component of the annual cash incentive award by including quantitative targets for the advancement of CCUS projects and technology and expanded the component to comprise 10 percent of the target company performance portion of the annual cash incentive award for executive officers.

JOHN FEICK, executive chairman of an environmental services provider with broad experience in the environmental, health and safety areas, chairs the Environmental Committee and is a member of our Compensation Committee;

ELISSE WALTER, a former Chairman of the U.S. Securities and Exchange Commission (SEC), current director of the SASB Foundation and noted speaker on sustainability and disclosure issues, serves on our Environmental and Audit Committees;

MARGARET M. FORAN, a recognized expert in corporate governance, who has had a leading role in strengthening corporate ESG principles and practices at several U.S.-based global companies, chairs our Compensation Committee and is a member of our Governance Committee; and

SPENCER ABRAHAM, a former U.S. Secretary of Energy who spearheaded the department’s research and development efforts in the areas of hydrogen fuel cells and clean coal technology, serves on our Governance and Compensation Committees.
Stakeholder Engagement

We focus on building trust through regular and transparent communication and engagement. By actively engaging with our stakeholders, we strive to understand and proactively address issues and concerns to develop beneficial outcomes.

Following the publication of our first climate report, we continued discussions with investors and other ESG-focused stakeholders. In these discussions, many investors provided positive feedback on the report and expressed the view that it struck an appropriate balance in analyzing both the risks and opportunities presented by climate change, and that it was responsive to the 2017 majority-supported stockholder proposal requesting the report. Many investors also appreciated understanding how Occidental’s low-carbon strategy is unique because it builds on our existing industry-leading expertise in CCUS.

Some stakeholders inquired whether our portfolio review process and modeling included a scenario aligned with limiting the increase in global temperature to 1.5°C. In response, we have included additional detail on the Sustainable Development Scenario, describing the scenario’s alignment with the goals of the Paris agreement and the scenario’s presence within the envelope of scenarios projecting a temperature rise below 1.5°C.

Stakeholders have also inquired about interim milestones for targets such as our goal to eliminate routine flaring by 2030, and requested timelines for establishing other GHG emissions reduction targets. In response, we are currently developing an approach with interim milestones for our commitment to eliminate routine flaring by 2030, and in this report we have committed to establishing in 2019 a direct CO₂ emissions intensity reduction goal for 2030, with interim milestones, and a methane emissions intensity reduction target.

To support the Board’s strategy and risk management oversight, senior management regularly reports to the Board on environmental and sustainability matters, including climate-related risks and opportunities. This interaction takes place during scheduled meetings, annual strategy sessions and informally during regular business.

During the Board’s 2018 session, the OLCV team updated the Board on Occidental’s low-carbon strategic process, including a review of objectives; CO₂ economy and competitive landscape; and low-carbon investment opportunities. The discussion included insights from both internal and external experts.

These agenda items reflect the Board’s engagement and efforts to heighten its understanding of how a low-carbon economy might affect the company, while supporting and strengthening Occidental’s shareholder value proposition. Future Board strategy sessions will continue to refine and enhance our consideration of climate-related risks and opportunities.

We look forward to continuing this dialogue on emissions and climate-related risks and opportunities with our shareholders and other key stakeholders through engagement and established reporting requirements, as well as evolving reporting/disclosure frameworks.
Occidental joined the Oil and Gas Climate Initiative (OGCI), a voluntary CEO-led initiative by 13 international oil, gas and energy companies taking practical actions on climate change. OGCI members leverage their collective strength to lower carbon footprints of energy, industry, and transportation value chains via engagements, policies, investments and deployment. Occidental executives hold several leadership positions within OGCI, including Ms. Hollub on the CEO Steering Committee, and Richard Jackson, Senior Vice President — Operations Support and President — Oxy Low Carbon Ventures, on the Executive Committee and the Board of OGCI’s Climate Investments fund.

In February 2019, Ms. Hollub was appointed as Chair of the Secretary of Energy Advisory Board (SEAB). The SEAB provides advice and recommendations to U.S. Secretary of Energy Rick Perry on the priorities for the Department of Energy (DOE), including promoting America’s energy security and spurring innovation. The DOE has supported various initiatives aimed at advancing and deploying CCUS technologies.

Occidental President and CEO Vicki Hollub and Occidental Chief Financial Officer Cedric Burgher have had key roles in climate-related discussions at the World Economic Forum in Davos, Switzerland, alongside other leaders in climate and industry.

Ms. Hollub and Mr. Jackson were featured speakers at the Cambridge Energy Research Associates (CERA) Week, one of the premier industry gatherings on issues and opportunities facing the global energy industry, speaking on carbon management strategies.

Ms. Hollub, along with key industry leaders, met with Pope Francis at the Vatican to discuss the imperative for global climate action.

Mr. Jackson authored a feature article on “Advancing CO₂ EOR as a Form of Carbon Capture in the Permian” in Hart Energy Magazine. Mr. Jackson noted, “The lower carbon future that global industries must work to achieve will depend on continued technical advancements in capture technology and the application of CO₂ EOR.…”

Ms. Hollub was a featured speaker at the 6th Annual Columbia Global Energy Summit hosted by Columbia University’s Center on Global Energy Policy.

* Vicki Hollub at Tudor, Pickering, Holt & Co. Energy Disruption Conference in Houston, Texas
Risk Management: Integrating Climate
Risk Management: Integrating Climate

Occidental has long recognized that robust risk assessment and proactive risk management are essential to safe and reliable operations and consistent returns for investors. We integrate climate-related risks into our strategic planning and investment decision-making process and perform routine risk assessments to support readiness for emerging challenges and opportunities.

Risk Identification and Management Processes

Across our business segments, Occidental bases its strategic and capital planning processes on a returns-focused approach with the intent of maximizing the value of our portfolio and executing on our priorities. As part of our investment decision process, we evaluate a wide range of opportunities and consider the associated risks such as technical subsurface challenges and technology advances, regulatory and environmental developments, geopolitics, macro commodity-price outlooks and localized risks. In addition, new larger projects require a carbon price sensitivity analysis before approval, as further described in “Carbon Price Assumptions” on this page.

In addition to the capital planning process, Occidental utilizes its enterprise risk management (ERM) program to identify, evaluate, mitigate and monitor significant risks. These ongoing risk evaluations inform climate-related strategic planning, as well as consideration and mitigation of climate-related physical risks. Occidental also uses the results from its IEA scenario analysis to assess the potential impacts of various climate-related energy price-and-demand scenarios on our existing portfolio, as further described in “Portfolio Review Process and Results” on this page.

Assessing and Managing Strategic Risks Associated with Climate

In this section, we discuss our carbon pricing assumptions and portfolio review process, including how our assets and reserves performed under modeling based on the International Energy Agency's 2018 Sustainable Development Scenario.

Carbon Price Assumptions

Currently, no carbon tax applies to any of Occidental’s oil and gas operations or products. However, as part of our commitment to informed capital planning and risk management, we include an assumed price on carbon in our capital approval process for the purpose of sensitivity modeling. This modeling allows our capital planners and senior management to analyze the long-term risks of exposure to carbon prices when extending the operating life or reserves of existing fields or entering new projects, while simultaneously instilling a culture of carbon-price sensitivity in our capital planning.

For 2019, we have increased our assumed price on CO2 emissions from $40 per metric ton to $50 per metric ton for new projects with a capital commitment of greater than $5 million. Based on the emissions intensity for Occidental’s worldwide oil and gas operations, this translates to a cost of about $1.80 per BOE.

Our sensitivity modeling approach is informed by policy-based carbon-price risk assumptions derived primarily from scenarios considered in the International Energy Association’s (IEA) World Energy Outlook (WEO), described more fully below. Additionally, as the largest commercial purchaser and injector of CO2 for enhanced oil recovery (EOR) in the Permian Basin and a global leader in this technology, Occidental has insight into market-driven CO2 supply pricing and routinely utilizes this information in our business and strategic planning.

Portfolio Review Process and Results

To supplement strategic planning discussions at the senior management and Board levels, Occidental considers various scenarios to assess potential future climate-related impacts on the company’s assets. For scenarios, Occidental relies on the IEA, an independent third party, to develop the narratives and associated assumptions (including demographic, government policy, technological change and energy supply and demand data), and to run the large-scale simulation models that generate equilibrium prices for energy and CO2 emissions.

In November 2018, IEA published its latest WEO. The WEO includes three main scenarios: Current Policies, New Policies and Sustainable Development. The IEA updates its projected oil and gas prices annually and, for the 2018 scenarios, these price assumptions reflect: (1) higher estimates for recoverable tight oil and natural gas liquids in the United States, (2) a reduction in the cost outlook for a variety of upstream projects and (3) a greater share of shorter-cycle investments on the supply side.

The 2018 Sustainable Development Scenario

For this report, we modeled the most rigorous of the main IEA scenarios, the Sustainable Development Scenario. Under this scenario, carbon prices are similar to those modeled in the 2017 Sustainable Development Scenario, reaching $140/metric ton in 2040. Although the Sustainable Development Scenario anticipates carbon emission pricing in several countries, for Occidental, this pricing still only applies to our U.S. oil and gas assets. Occidental does not have operations in the other countries where carbon prices were identified in the Sustainable Development Scenario.

For our assessment of potential impacts of the Sustainable Development Scenario on our proved reserves, Occidental used a reference case model to represent our asset base at year-end 2018. The assessment was based on a representative portfolio of assets that contained a majority of proved reserves from our U.S. and non-U.S. oil and gas locations reported in our 2018 Form 10-K. Planned capital spending and expected operating costs from the approved development plans that support the reserves were embedded in the model. The reference case model used the oil, natural gas liquids (NGL) and natural gas prices calculated in accordance with SEC rules for determining year-end 2018 proved reserves and computing the Standardized Measure of Discounted Future Net Cash Flows by application of a 10 percent discount factor (NPV10 valuation) as reported in Occidental’s 2018 Form 10-K. For estimating reserves, SEC rules require the use of the unweighted arithmetic average
of the first-day-of-the-month price for each month within the year, unless prices were defined by contractual arrangements. Oil, NGL, and natural gas prices used for this purpose were based on posted benchmark prices and adjusted for price differentials including gravity, quality and transportation costs. For 2018, the calculated average West Texas Intermediate (WTI) oil price was $65.56 and the calculated average Henry Hub gas price was $3.10. We also used a $0 price on CO2 emissions for the reference case model, since none of Occidental’s oil and gas operations or products are currently subject to a carbon pricing structure.

Portfolio impacts were assessed by applying the outcomes for the Sustainable Development Scenario for oil and natural gas prices and CO2 prices in the regions where we operate. At CO2 prices of $63 and $140 per metric ton for the U.S., as used in years 2025 and 2040 of the Sustainable Development Scenario, we estimate Occidental’s cost burden is approximately $1.70 and $3.80 per BOE on U.S. reserves. Oil and gas product prices under the Sustainable Development Scenario are generally higher than our reference case model prices calculated in accordance with SEC rules for reserves calculations. Considering product and CO2 prices under the Sustainable Development Scenario, proved reserves for U.S. assets modeled 1 percent lower, although NPV10 valuation showed no negative impact. For Occidental’s non-U.S. oil and gas assets, there is no negative impact to proved reserves or to NPV10 valuation. In aggregate, considering Occidental’s worldwide portfolio of oil and gas assets, there is no negative impact to proved reserves or NPV10 valuation.

The Sustainable Development Scenario did not demonstrate a significant risk of stranded assets. Occidental has a robust resource base with a focus on short-cycle projects and disciplined cost management. Our CO2 EOR business, which has a low decline rate and fully-developed infrastructure, acts as a hedge against longer-cycle risks. In conducting the portfolio analysis, we did not include any estimate of the potential benefits that may result from expanded CCUS activities.

We recognize that additional climate scenarios are being developed using a spectrum of price and demand assumptions. We believe our strategy for resilience — utilizing and sequestering CO2 at a price and volume that adjusts relative to potential-economic or regulatory carbon constraints or incentives — is flexible enough to be attractive to investors in various carbon-constrained scenarios, while still aligning with the Paris climate accord goals. Nonetheless, we will continue to evaluate new scenarios and reassess our asset portfolio based on material changes in leading market forecasts, carbon pricing regimes or significant changes to our asset mix.

Physical Risk Resilience
Occidental’s business and risk assessments include analyses of potential physical impacts such as flooding or natural resource stresses. The company has several facilities located near the U.S. Gulf Coast or other regions prone to weather events capable of producing life-threatening conditions, facility damage or operational interruptions. Effective planning and mitigation improve access to and the safe and efficient operation of these and other dependent facilities, as well as our workers’ communities.

In addition to holding third-party insurance with respect to certain weather-related losses, Occidental’s Health, Environment and Safety Management System integrates such issues — ranging from those that are event-driven to those that are the result of a systemic change — into our risk and operations management structure. Facilities exposed to tropical storm risks are hardened against severe weather events and routinely inspected, and have historically weathered such events without casualties or major damage. These facilities have emergency preparedness and response plans that are initiated in advance of identified storms.

Following severe weather events, our facilities undergo detailed inspection and recovery protocols to support a safe and timely return to full production. Various channels of communication are maintained during and after events, and extensive resources to speed both facility and employee recovery are inventoried, pre-positioned and quickly distributed to impacted facilities and workers.

Other Climate-related Risks
Other potential physical or resource risks that could arise from long-term shifts in climate, including water or raw material scarcity, changes or disruptions in energy markets, geopolitical risks, or other supply and logistics challenges, are considered in our routine business planning and ERM processes. We believe our strategy for resilience and sustainability, including resource conservation and smart logistics, is robust and flexible.
Our Strategy for Resilience and Opportunity
Our Strategy for Resilience and Opportunity

Occidental’s strategy for business sustainability in a low-carbon economy builds upon our core strengths as an oil and gas company: a deep understanding of the subsurface and the ability to operate older fields at a low cost while maximizing hydrocarbon recovery. Occidental’s high-return portfolio combined with long history and expertise in enhanced oil recovery has proven resilient in low oil price environments and can create new business opportunities for Occidental as the value of CCUS increases under low-carbon scenarios.

Following a comprehensive portfolio review in 2013, Occidental took action to become a more focused and better-integrated company, positioned to be an industry leader in financial, operational and environmental performance. The attributes of this strategy include our short-cycle investment portfolio, low base-production declines, strong financial position and a focus on shareholder return through value-based development. This portfolio optimization commenced as oil commodity prices began a significant drop, but the strength of our streamlined portfolio and conservative balance sheet provided Occidental with the time and capital to rebuild profits through higher-margin and better-returning projects. By exiting several higher-risk, lower-returning assets, we are better positioned to execute our long-term strategy, operate more efficiently and enhance value for shareholders.

Occidental’s assets and business segments are regularly reviewed by our Board and management to enhance strategic alignment and positioning for future opportunities and risks. Occidental’s industry-leading position and expertise in CO₂ EOR differentiates us from our peers, and represents a competitive advantage against higher-cost operators in areas and projects, while also maintaining a flexible asset base.

Our portfolio carries low future capital commitments and allows us to adjust to emerging alternative investments. We can manage future carbon price impacts by shifting capital to lower CO₂-intensity areas and projects, while also maintaining a competitive advantage against higher-cost operators that require more capital to sustain or grow.

Carbon Capture and Enhanced Oil Recovery Leadership

A key differentiator in our resilience strategy is our ability to leverage our unique expertise in CO₂ EOR and CCUS. CCUS is a process that captures anthropogenic (man-made) CO₂ emissions from sources such as coal-fired power plants, ethanol plants and cement production. The CO₂ is then used in a manner that prevents it from entering the atmosphere, usually by sequestering (permanently entrapping) the CO₂ deep underground. Captured CO₂ can also be used in industrial processes, as Occidental does at some of its chemical plants, or as feedstock for manufacturing products like bioplastics, concrete and coatings.

Occidental Oil and Gas: Flexible, Low-cost Assets with Unique Technical Capabilities

Today, we are focused on core domestic and international assets that are competitively advantaged through geography and scale, and provide long-term business opportunities under a wide range of low-carbon scenarios. Located in the U.S. Permain Basin, Colombia, Oman and UAE, our core operating and development areas are in mature hydrocarbon basins with pre-existing production and infrastructure. In each core operating area, we benefit from scale, technical expertise, environmental and safety leadership, and commercial and governmental collaboration. We can bring additional production quickly to market by new development and by extending the life of older fields. These assets provide high-margin production and a portfolio with decades of future projects that are flexible, have short-cycle investment paybacks and low base-production declines.

Our portfolio carries low future capital commitments and allows us to adjust to emerging alternative investments. We can manage future carbon price impacts by shifting capital to lower CO₂-intensity areas and projects, while also maintaining a competitive advantage against higher-cost operators that require more capital to sustain or grow.

Carbon Capture and Enhanced Oil Recovery Leadership

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Low Base Decline: Our combined oil and gas assets provide a competitive low base production decline, which lowers long-term risk against price volatility and timing of investments.

Short Payback Period: The average payback timeframe for all projects that develop our proved reserves is approximately three years.

Low-Cost Inventory: At $50 WTI, Occidental can continue to grow its production at 5 – 8 plus percent annually and sustain its dividend within cash flow. Within our primary growth area, Permian Resources, we have approximately 17 years of undeveloped inventory at current activity levels that is profitable at oil prices less than $50 per barrel.

Public Policy Engagement on CO₂ EOR and CCUS

Occidental’s ongoing engagement with key government stakeholders and policy groups, along with our track record as an operator of world-scale CO₂ EOR floods, positions us as a leader on the economic and environmental benefits of CO₂ EOR and CCUS.

• Occidental worked with a bipartisan coalition that successfully sought enactment of the FUTURE Act, which extends a federal tax credit for CO₂ capture and sequestration and incentivizes the use of man-made CO₂ in EOR operations.

• Occidental engages the U.S. EPA, Department of Energy and other agencies, to advocate for the development of programs and infrastructure to increase the utilization of CCUS.

• Occidental worked with the EPA and other stakeholders to develop procedures to transparently measure, report and verify CO₂ sequestration through CCUS, which were subsequently codified into regulations.

• We work with the Carbon Capture Coalition (formerly the National Enhanced Oil Recovery Initiative) to support CCUS incentive legislation and fiscal policies to spur commercial deployment of technologies to enable the capture and sequestration of anthropogenic CO₂.
CCUS plays an important role in achieving a low-carbon future in all recent IEA scenarios.

The IEA WEO 450 Scenario and the IEA Energy Technology Perspectives 2°C Scenario (2DS) lay out pathways and emissions trajectories consistent with limiting the average global temperature increase to a temperature rise of around 2°C. In these trajectories, CCUS is a meaningful portion of the cumulative emissions reductions needed by 2040.

The 2018 IEA Sustainable Development Scenario reflects a world energy system that includes increased energy efficiency, more use of electricity, increased use of renewable energy and more CCUS, which accounts for 7% of the cumulative emissions reductions needed by 2040.

Occidental’s EOR operations store 18 million tonnes of CO₂ per year.
Closed-loop CO₂ EOR

Occidental’s CO₂ EOR operations employ a “closed loop” so that more than 99.9 percent of the supplied CO₂ that is injected ultimately becomes permanently trapped in the reservoir. This graphic illustrates a representative snapshot of the process. It shows that the CO₂ injected into the reservoir at a point in time consists of newly supplied CO₂ plus CO₂ that is recycled in the process. During each pass through the reservoir, approximately 40 percent of the injected volume is sequestered (equivalent to the volume of new CO₂ supplied); the remaining 60 percent is produced, separated from the oil and gas products, and reinjected.

How CO₂ EOR Works In the Reservoir

Water is injected into the oil field, releasing oil from pore spaces in the reservoir.

CO₂ is then injected to flood the field, dissolving and displacing some of the remaining trapped oil.

Water is used along with CO₂ to more efficiently sweep the full volume of the reservoir. Approximately 40 percent of the CO₂ is trapped in the areas previously occupied by oil.

OCLV Opportunities Outlook

These business opportunities will be pursued through low-carbon technology, projects and services. An additional aspect of Occidental’s low-carbon pursuits is to enable and create partnerships for improved business and climate solutions. Looking forward, collaboration in technology and low-carbon value chain opportunities will be critical to the speed and scaled deployment necessary for both enhanced profitability and carbon reduction.

The OLCV team led the development of our low-carbon strategy, which includes three main pathways to decarbonization: emissions reduction, reduced energy consumption and reduction of atmospheric CO₂ concentrations. We are reviewing and prioritizing potential low-carbon business opportunities using the following:

- **Strategic fit to Occidental**, to assess the natural alignment with our capabilities, long-term goals and existing portfolio,
- **Market fundamentals of each segment**, to evaluate the competition, size, growth prospects, and technological maturity,
- **Financial attractiveness**, to analyze capital requirement, rate and time frame of return, and
- **Carbon reduction**, to quantify the long-term carbon abatement potential and support of broader climate risk mitigation pathways.

We are pursuing a portfolio of development opportunities over multiple time horizons leveraging our CO₂ EOR leadership to advance CCUS. This portfolio will seek to first capture the most readily available opportunities to demonstrate commerciality of CCUS and to gain a competitive advantage in what we expect will be a rapidly expanding industry, then help lead that industry to achieve global scale. We recognize that there are challenges and risks associated with a CCUS-dependent strategy. However, we also note that most recognized 1.5 – 2°C scenarios depend on the success of the CCUS industry, and believe our depth of experience with, and current scale of, CO₂ EOR and CCUS operations will enable us to lead in the advancement of our and the industry’s success.

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Reduce Residential / Commercial Demand

Reduce Transportation Emissions: Avertine

Non-renewables

Substitute carbon-intensive fuels with lower-carbon fuels

Tidal

Solar

Renewables

Direct Emissions Reduction Plan

De-Carbonizing Occidental Operations: Goldsmith and Oman Solar

CO₂ from Air; Carbon-Neutral Fuels: Carbon Engineering

Direct air capture

Negative emissions

Geo engineering

45Q (Future Act) approved by Congress incentivizing carbon capture

White Energy capture project feasibility study announced

Established Low Carbon Ventures subsidiary

Joined Oil and Gas Climate Initiative (OGCI)

Goldsmith solar and GlassPoint Oman solar

Investments in NET Power and Carbon Engineering

Direct emissions reduction plan and targets communicated

Technical service partnerships to deploy CCUS globally

Large-scale use of anthropogenic CO₂ for existing EOR operations

Utilization of CO₂ to create products and materials

First Ethanol CO₂ Capture Project under FUTURE Act

Emissions-Free Power: NET Power

Clean Growth, Clean Power: OGCI Clean Gas Project

Expansion of CO₂ EOR Assets

Reduce CO₂ Emissions Per Unit Work

Positioned for a Lower Carbon Economy

Reduce CO₂ Stock

Reduce Energy Demand

Carbon Capture

Sequestration

Carbon Use

High energy equipment

High efficiency construction materials

Direct emissions reduction plan

Reduce transportation demand

Reduce industrial demand

Reduce energy and fuel demand

High energy efficiency equipment

Large-scale use of anthropogenic CO₂ for existing EOR operations

Utilization of CO₂ to create products and materials

2018

2019

2018

2019
OLCV’s Recent Activities

White Energy
In June 2018, OLCV partnered with White Energy, one of the nation’s largest ethanol producers, to evaluate the economic feasibility of constructing carbon capture facilities at White Energy’s ethanol plants in Hereford and Plainview, Texas for delivery to Occidental’s CO₂ EOR fields in the Permian Basin. This project is expected to capture ~700,000 tonnes of CO₂ per year and is designed to be eligible for federal 45Q tax credits.

Carbon Engineering
In January 2019, OLCV made an equity investment in Carbon Engineering, a Canadian developer of technology that captures CO₂ directly from the atmosphere. The captured CO₂ can supply CO₂ EOR or be converted to fuels for sale. A commercial-scale plant could capture 1 million metric tons of CO₂ per year and synthesize 2,000 to 5,000 barrels of fuels per day.

In 2015, Carbon Engineering commissioned a pilot and began converting the captured CO₂ into fuels in December 2017. This technology has the potential to increase Occidental’s anthropogenic CO₂ supply and aid in offsetting Occidental’s overall GHG emissions.

NET Power
In December 2018, OLCV announced an investment agreement with NET Power to advance the development of NET Power’s low-cost, natural gas electric power system which generates no atmospheric emissions and inherently captures all CO₂. This technology has the potential to produce electricity at a lower cost than existing power plants. Additionally, pipeline-quality CO₂, for EOR development is produced as a by-product of the process. NET Power was awarded the 2018 ADIPEC Breakthrough Technological Project of the Year at the annual Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC), the biggest oil and gas show in the Middle East.

Occidental Participation with OGCI in the UK’s First Full-Chain CCUS Project
In November 2018, OGCI Climate Investments announced that it is entering into a strategic partnership with Occidental, BP, ENI, Equinor, Shell and Total to progress the Clean Gas Project, the UK’s first commercial full-chain CCUS project in Teesside. It will combine CO₂ captured from new, efficient low-carbon power generation, as well as local industrial emitters.

“CCUS is critical to meeting the climate goals of the Paris Agreement and Climate Investments is proud to move this project forward within the context of the Tees Valley Cluster. The Clean Gas Project is an example of how industry can work together to bring forward proposals that support governments ambitions for CCUS; we recognize the work and commitment by the UK government, the Tees Valley Mayor, the TVCA and the South Tees Development Corporation to deliver the practical action needed to move CCUS forward.” — Pratima Rangarajan, CEO of OGCI Climate Investments.
Lower-Carbon Natural Gas Opportunities

Occidental has been an active investor in the Middle East for more than four decades. We are well-regarded in this key region for our outstanding performance record, technical expertise and effective working relationships with strategic partners. Occidental has a history of developing and delivering major gas projects on time and within budget with our national oil company partners.

At year-end 2018, our Middle East assets represent 38 percent of Occidental’s total worldwide production and approximately 1 billion BOE of proved reserves, of which over 65 percent is natural gas and NGLs. This large position in gas and gas liquids allows Occidental to invest capital opportunistically in a region with growing gas demand. Should global market signals indicate a long-term demand shift away from higher-emitting fuels, these gas-rich Middle East assets represent a strong element of Occidental’s resiliency strategy.

Middle East Natural Gas Development

In Oman, Occidental’s major operations are located in northern Oman and at the Mukhaizna Field in the central region. Occidental and its partner, the Oman Oil Company, have engaged in a collaborative effort to accelerate additional gas production to meet the near-term needs of Oman. Occidental was recently awarded new exploration blocks in Oman.

In the UAE, Occidental partnered with the Abu Dhabi National Oil Company (ADNOC) in Al Hosn Gas, one of the largest natural gas developments in the Middle East. The project, in which Occidental holds a 40 percent interest, is important to the “Abu Dhabi Economic Vision 2030.” The plant became operational in 2015. The plant processes about 1.3 billion standard cubic feet per day of well fluids and provides approximately 500 million cubic feet per day of clean natural gas, along with other products. A project is now underway to expand capacity to meet growing demand for gas in the region. In addition, Occidental was recently awarded new exploration blocks in the UAE.

In Qatar, Occidental has a 24.5 percent interest in the Dolphin Energy project in Qatar’s North Field, one of the world’s largest gas reservoirs. Approximately 2.5 billion cubic feet of natural gas and liquids per day produced from wells offshore are processed at the onshore plant in Ras Laffan, Qatar, among the biggest gas plants ever built. Processed gas is transported to markets in the United Arab Emirates and Oman. The project, which became operational in 2007, has had a significant regional economic impact.
In September 2018, Occidental joined the Oil and Gas Climate Initiative (OGCI). OGCI is a voluntary CEO-led initiative taking practical actions on climate change. OGCI members leverage their collective strength to lower carbon footprints of energy, industry and transportation value chains via engagements, policies, investments and deployment. OGCI pursues these objectives through policy and strategy initiatives and strategic investments.

OGCI Policy and Strategy
OGCI engages with a broad ecosystem of stakeholders to set the agenda for its long-term climate goals and to share learnings. OGCI companies set a target to reduce the collective average methane intensity of their aggregated upstream oil and gas operations to below 0.25% by 2025, with the ambition to achieve 0.20%. Starting from a baseline of 0.32% in 2017, reaching the 0.20% target would translate into reducing collective methane emissions by more than one third — approximately 600,000 tonnes annually — by the end of 2025. OGCI is also working to estimate and improve the methane emissions intensity from the full gas value chain, including transport and distribution to final customers. In addition, OGCI member companies support the goal of zero routine flaring by 2030.

OGCI Climate Investments
Climate Investments is OGCI’s $1B+ investment fund established to lower the carbon footprint of the energy and industrial sectors. Investments are focused on three objectives:

1. Reducing methane leakage, from the well head, through gas processing and transport, to endpoint distribution and use.
2. Reducing CO₂ by investing in efficiency solutions that lower the carbon footprint of the energy, industrial and transport sectors. In other words, support innovation that can deliver the same goods and services but with a lower carbon intensity.
3. Advancing CCUS. Climate Investments invests in breakthrough technologies that will capture CO₂ and recycle it into products or store it safely. Climate Investments also invests in projects that demonstrate the commerciability and scalability of the CCUS value chain.

Occidental’s membership will help drive better performance, and its collaboration with other members should help the company develop and deploy climate-related opportunities faster and on a broader scale. OGCI is an important step forward for the industry, and important facet of Occidental’s climate engagement.

Efforts to Reduce Direct Emissions
Occidental’s longstanding policy is to seek continuous improvement in resource recovery, conservation, pollution prevention and energy efficiency, including ongoing efforts to recycle and reuse water and manage and capture methane and other GHG emissions. Our business decision-making process integrates these principles to advance the company’s commitment to low-cost production of oil, natural gas and commodity chemicals.

We take a hands-on approach to improve the efficiency and reliability of the equipment and facilities used in our oil and gas activities. We perform health, environment and safety (HES) assessments to identify any compliance gaps, potential HES risks and opportunities to enhance operational efficiency. The results are reported to operations, management and the Environmental Committee and are turned into action plans, which the operations teams then implement.

Some important emission reduction efforts are described in further detail on the following page.

Reducing Methane Emissions
At its operations worldwide, Occidental air quality experts help maintain compliance with all applicable national and local requirements, obtain required authorizations and permits and develop strategies to reduce emissions. This includes efforts to minimize flaring of natural gas under Occidental’s commitment to eliminate routine flaring by 2030. Our goal is to
bring natural gas to markets, which generates returns for shareholders, rather than flaring or emitting it into the atmosphere.

We devote significant resources to capturing emissions of methane and other organic compounds by retrofitting existing facilities and designing and constructing new facilities. Occidental has adopted consistent practices across its U.S. oil and gas operations for identifying volatile organic compounds (VOCs) and methane leaks. Our leak detection and repair (LDAR) program incorporates audio, visual and olfactory (AVO) inspections, optical gas imaging (OGI) cameras, and EPA “Method 21” procedures to monitor components at field and plant operations for fugitive emissions. Wells, separation equipment, storage tanks, flowlines, dehydration units, piping and other associated field equipment are included, along with our gas compression and gas processing plants.

We follow the leak detection procedures required by regulation and we engage with other operators to share best practices. We voluntarily monitor sites and facilities that are not covered by regulatory programs to identify and remedy fugitive emissions containing VOCs and methane. For example, in Texas, we conduct AVO walk-through inspection of all components at production pads and compressors at least weekly. Identification of a leaking component at field locations triggers a maintenance request for repair within 30 days (15 days at our large gas-processing facilities), unless the equipment requires a process shutdown to effect the repair. For facilities where we use Method 21 leak detection protocols, Occidental relies on a company that specializes in providing LDAR services. That company employs full-time monitoring experts and is routinely audited by state and federal agencies.

Occidental employs standardized designs that minimize emissions for new U.S. facilities. The same design approach is used where we consolidate individual field tankage or test stations into larger facilities to improve efficiency. The design approach considers facility throughput, gas takeaway that can be identified, camera set up and operation, in-field survey techniques under varying weather conditions, and proper safety practices.

In December 2017, Occidental joined more than 20 (now more than 50) other oil and gas operators in launching the American Petroleum Institute (API) sponsored Environmental Partnership program aimed at reducing methane emissions from production operations. The voluntary program encompasses two initiatives applicable to Occidental:

- **Leak Detection and Repair:** Implement monitoring and timely repair of fugitive emissions at selected sites. Occidental surpassed its commitment to perform more than 900 leak surveys in 2018.
- **Equipment Upgrade:** Pneumatic devices using pressurized gas are components of compressors, separators, pressure vessels, piping and control systems in Occidental’s oil and gas facilities. These pneumatics can use compressed air or pressurized natural gas. Of those that use natural gas, the vast majority in our U.S. facilities are versions with no or very low emissions. Occidental has been pursuing a plan to eliminate or retrofit more than 900 high-bleed natural gas pneumatic controllers from U.S. operations before 2023.

We seek to minimize our emissions by using energy efficient equipment at all our oil and gas production facilities. Most compressors, pumps and other major equipment installed throughout Occidental’s Permian Basin operations are electrically driven or use low-emission engines. In remote locations, some meters and controllers are powered by solar arrays. Occidental expects to eliminate or retrofit more than 900 high-bleed natural gas pneumatic controllers in its U.S. operations before 2023.

Occidental committed to perform more than 900 leak surveys in 2018 and we exceeded that number.

Occidental is committed to eliminate routine flaring by 2030.

Occidental uses infrared optical gas imaging (OGI) cameras for fugitive emissions surveys. The company employs full-time monitoring experts and is routinely audited by state and federal agencies.

Occidental’s operations before 2023.

"Green completion” practices are designed to prevent release of gas directly to the atmosphere.

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infrastructures, other equipment already in place, the remoteness of the location and other factors. Where gas takeaway pipelines exist or are included in the field development plan, the standard design calls for gas separation and sales. To minimize emissions from production tanks and other equipment, closed vent systems route gas to vapor recovery towers or vapor recovery units (VRUs) and often have vapor combustion units (VCUs) to combust excess gas when a VRU is unavailable. Where the flow of gas is insufficient to be recovered economically for sale or compressed for reinjection, it is used as fuel or sent to a flare to minimize methane emitted.

For drilling activities, Occidental has worked closely with its contractors to improve drilling efficiency, significantly reducing the number of days where rigs and the associated equipment are on site, resulting in energy and emissions savings. For completion and workover activities, Occidental specifies a preference that contractors use low-emitting equipment on the well pad, leading to reduced diesel fuel consumption and GHG emissions.

In the Permian Basin, Occidental is working toward building the necessary infrastructure and permanent production equipment and tanks in advance of well completion activities so that emissions, including methane and other VOCs (“flowback” emissions), are sent to gas handling facilities and sales pipelines from the moment production begins. These “green completion” practices are designed to prevent release of gas directly to the atmosphere. Prior to any regulatory requirement, Occidental’s U.S. oil and gas operations began performing reduced emissions completions for all hydraulically fractured wells.

Increasing Efficiency Across the Transportation and Distribution Chain

Occidental’s midstream and marketing segment strives to maximize the realized value of production from the oil and gas and chemicals businesses. In 2018, Occidental sold several non-core assets, including the Centurion common carrier oil pipeline and storage system, Southeast New Mexico oil gathering system and Ingleside Crude Terminal. Following the transactions, Occidental retained its long-term flow assurance, pipeline takeaway and export capacity through its retained marketing business. Occidental seeks to continually increase the efficiency of its product transportation and distribution chain in order to reduce logistics costs and associated emissions, and maximize the volume of product that goes to markets.

Smart Logistics

The logistics of transporting personnel, supplies and equipment in remote operating regions can present traffic hazards along transportation corridors and safety risks arising from material management. These logistics also consume significant volumes of transportation-related energy and produce associated environmental emissions. We have been working to develop smart and creative ways to minimize the risks and impacts of these logistics.

In 2018, we commissioned the Aventine logistics-and-maintenance hub in the Permian Basin. Located in New Mexico, this 240-acre state-of-the-art facility brings production, transportation and storage facilities for drilling and hydraulic fracturing materials and equipment into one centralized site strategically located to serve large portions of our operations. It enables Occidental to drill and complete wells within the region more efficiently and effectively.

At Aventine, materials can be transloaded by truck or rail. There is capacity to store up to 30,000 tons of frac sands in addition to facilities for maintaining pipe, casing and tubing supplies. The service-provider base supports fracturing and perforating activities, with additional service lines planned for the future.

We developed Aventine in collaboration with key service company providers to maximize integration of services and logistic efficiencies.

Several features of Aventine demonstrate the environmental, safety and economic benefits of smart logistics planning. The coordinated and uncrowded design of the facility enhances workforce safety and reduces hazards that typically arise from ad hoc wellsite logistics. Aventine is expected to lower road transportation and related emissions by reducing miles traveled from approximately 20 million to 8 million over the next 5 years. Already, truck mileage has been reduced by 1.5 million miles.

Cogeneration

Occidental’s cogeneration facilities are highly efficient natural gas-fired power plants that co-produce electricity and steam for adjacent plants, while also providing excess electricity into local markets. Cogeneration, or combined heat and power (CHP), significantly increases electrical power generation efficiency over traditional methods while reducing CO2 emissions by more than 50 percent.

The GHG emission-reduction benefits from Occidental’s natural gas-fired cogeneration facilities are substantial. At Occidental’s chemical manufacturing plants, CHP facilities at full utilization are estimated to reduce GHG emissions by 5 million metric tons per year compared to equivalent power supplied from the electrical grid. The steam produced by these combined cycle facilities reduces the nearby manufacturing facilities’ CO2 emissions by more than 375,000 metric tons annually, compared to steam supplied by typically configured boilers.
In furtherance of Occidental’s commitment to eliminate routine flaring by 2030, and consistent with OGCI’s similar objective, Occidental has taken concrete action to reduce flaring. One example is our collaboration with the national oil and gas company Qatar Petroleum, our partner in Occidental’s Qatar operations and owner of the natural gas resource. Our operations have reduced flaring emissions in Qatar by more than 99 percent since 2005. Prior to the implementation of gas capture projects, baseline CO₂e emissions were more than 6 million metric tons per year; they are now less than 0.1 million metric tons per year. Through 2017, a cumulative total of more than 64 million metric tons of CO₂e emissions have been avoided.

In Oman, gas capture and methane utilization projects have contributed to a significant reduction in gas flared at the Far West and Khamilah fields. From 2013 to 2018, we reduced the amount of gas flared from more than 10 billion cubic feet per year (BCF/yr) to 2.4 BCF/yr, a decrease of more than 75 percent — cumulatively equivalent to almost more than 1.5 million metric tons of CO₂. In 2018, Occidental commissioned additional new compressors in Far West to increase capacity and reduce flaring to 4 million cubic feet per day.

In Block 9 of the Safah Field, Occidental installed gas compression systems to reduce flaring. With the support of the Oman government, the project was the first in the country to qualify under the United Nations Clean Development Mechanism (CDM) to create tradable, saleable, certified emissions-reduction credits. Original flare volumes at Safah were approximately 20 BCF/yr; they are now less than 4 BCF/yr. Over the initial CDM project period (2013-2019), cumulative gas reductions of more than 75 BCF are expected (equivalent to 775,000 metric tons of CO₂ per year).

From 2016 to 2018, Occidental reduced gas flaring emissions intensity by approximately 17 percent at its EOR plants in the Permian Basin. Typically, flaring results from non-routine operations, maintenance and weather-related upsets. A significant contribution to this performance improvement is more efficient operations at the Seminole Gas Plant, which was acquired in 2017. Compared to operations in 2016 under the former owner, Occidental has reduced flaring by more than 50 percent through improved plant reliability and uptime, more automation, optimized use of existing infrastructure, and empowered decision-making by operations personnel.

In December 2017, OxyChem began production of 4CPE at its facility in Geismar, Louisiana. 4CPE is a raw material used in making next-generation automobile refrigerants with low global warming and zero ozone-depletion potential. Operating at design capacity (18,000 metric tons of 4CPE), the project represents a reduction of 26 million metric tons/yr CO₂e from the production of next-generation automobile refrigerants. The new refrigerant is approved by the EPA and meets the European Union regulatory requirements for automobile air conditioning systems. The 4CPE manufacturing process was developed and patented by OxyChem scientists.

OxyChem is the world’s second-largest merchant marketer of chlorine and the largest marketer of its co-product, caustic soda. Another significant co-product of the production process is hydrogen gas, some of which is sold to customers and another portion of which is used as a fuel to generate electricity and heat/steam for OxyChem manufacturing facilities. When used as a fuel, the combustion of hydrogen with oxygen produces no GHG emissions — water is the only combustion product. Over the past 10 years, OxyChem’s production and use of hydrogen as a fuel source has resulted in 3.8 million metric tons cumulative GHG emissions avoidance through 2017.
At the Mukhaizna Field in Oman, heat recovery units have been installed in all gas-fired power turbine generators to produce steam used in enhanced oil recovery. This heat recovery equipment has reduced emissions by 2.7 million metric tons of CO$_2$e since 2010.

Cogeneration is more than just an energy-efficient method of generating electricity and thermal energy. It has the potential to deliver lower overall system costs, stronger critical infrastructure and improved grid reliability.

Electricity Demand Response

In Texas, Occidental is one of the leading providers of Responsive Reserve Service, which helps improve reliability of the electric grid. By voluntarily offering to reduce power consumption at specific Occidental locations when called upon by the grid operator, Occidental provides the Texas electrical grid with a demand response tool which helps maintain grid reliability for industrial, commercial and residential consumers. Occidental continuously evaluates opportunities to reduce the company’s electric costs by instituting practices to consume less electricity in high-demand hours, by minimizing electric transmission costs and by increasing participation in the Responsive Reserve Service market.

Integration of Solar

Occidental is the largest operator of CO$_2$ EOR fields in the Permian Basin, which requires substantial amounts of electricity to process and compress CO$_2$, operate lift systems, and separate water. Occidental is constructing a 16 megawatt solar generation facility near Odessa, Texas that will supply electricity to an adjacent Occidental oil field. When completed, the project will reduce Occidental’s operating costs and the carbon intensity of its operations.

Approximately 120 acres will be utilized to install more than 174,000 solar photovoltaic modules to convert sunlight into direct current electricity. Monitoring and control equipment will be installed at the project site and in remote control room locations. We expect the project to begin operations in late summer 2019.

In Oman, GlassPoint Solar and Occidental of Oman have signed a Memorandum of Understanding that could lead to a large solar steam plant, exceeding two gigawatt equivalents of solar thermal energy, at Mukhaizna Field in central Oman, where we operate one of the world’s largest EOR steam floods. GlassPoint would deploy its proven solar technology to produce up to 100,000 barrels per day of steam from oil field water, which would be purchased by Occidental and used to facilitate production.

With preliminary studies complete, engineering work has now commenced to define the project scope and field integration plans. The proposed solar project could save more than 725,000 tons of CO$_2$ emissions each year.

GlassPoint Solar, Oman

“Approximately 120 acres will be utilized to install 174,000 solar photovoltaic modules to convert sunlight into direct current electricity.”

3 Goldsmith solar facility
Metrics, Targets and Next Steps
Metrics, Targets and Next Steps
Occidental has publicly reported its GHG emissions for over 15 years, both through our participation in the Climate Disclosure Project (now CDP) since its inception in 2003, as well as through our own social responsibility reporting.

Using the most recent data, from 2016 to 2017, Occidental’s sum of direct and indirect GHG emissions (Scope 1 + Scope 2) decreased more than 3 percent year-over-year (16.0 to 15.5 million tonnes CO₂e). The decrease in combined Scope 1 and 2 emissions was primarily due to decreases in CO₂e emissions associated with our chemical segment’s power consumption, while the Scope 1 increase was primarily due to increased oil and gas production and acquisitions. As Occidental acquires existing operations, it works expeditiously to reduce flaring and venting and enhance operational efficiency so that associated emissions increases are minimized over time.

In its 2018 CDP response, Occidental provided an estimate of the Scope 3 — Use of Sold Products emissions (63 million tonnes CO₂e) for its oil and gas production.

While we will continue to disclose our Scope 1, Scope 2 and Scope 3 emissions, we are also evaluating metrics to more comprehensively express our overall impact on atmospheric concentrations of CO₂. We believe commonly accepted GHG reporting frameworks that utilize Scope 1, Scope 2, and Scope 3 to categorize GHG emissions may not fully account for a company’s total impact — both positive and negative — on atmospheric concentrations of CO₂.

In particular, the sum of Scope 1 and Scope 2 emissions from most oil and gas producers is relatively small compared to Scope 3 emissions, so focused efforts to reduce Scope 1 and Scope 2 emissions will only modestly benefit the overall climate equation. Likewise, Scope 3 emissions from oil and gas

“The Starting in 2020, new U.S. oil and gas projects will be developed with a Scope 1 CO₂e emissions intensity for field production activities that is 10% below the 2018 value.”

SCOPE 1, 2 AND 3 EMISSIONS

The GHG Protocol Corporate Standard classifies a GHG emissions into three scopes. For Occidental, Scope 1 emissions are direct GHG emissions from owned or controlled facilities. Scope 2 emissions are indirect GHG emissions from the generation of purchased energy consumed by Occidental. Scope 3 emissions are an estimate of the GHG emissions arising from downstream use by others of the oil and gas that Occidental produces.
production is more of a measure of consumer demand for oil and gas products than a measure of the impact of producers’ operations.

Importantly, the formula for calculating Scope 1, Scope 2 and Scope 3 emissions does not reflect the positive impacts on atmospheric CO₂ concentrations from the capture of third-party emissions at the source, or from removal of CO₂ from the atmosphere, and subsequent sequestration of those volumes. As noted in the Strategy section of this report, CCUS is an essential mechanism to achieving the atmospheric CO₂ reduction goals of the Paris climate accord, and a central component of Occidental’s climate-related sustainability strategy. At this time, we believe GHG reporting frameworks do not fully reflect the overall impacts of tools or strategies necessary to achieving climate goals.

For these reasons, Occidental is exploring the development of a metric that reflects its overall impacts on atmospheric GHG concentrations and progress towards achieving global climate goals. As a first step, we will disclose later this year a 2030 direct CO₂e emissions intensity goal for our oil and gas operations, with interim milestones. In the future, we will establish and disclose a holistic impact metric that considers carbon sequestration of third-party emissions or other efforts to reduce GHG emissions or atmospheric concentrations.

This year, Occidental is formalizing in this report several goals and metrics:

1. Starting in 2020, new U.S. oil and gas projects will be developed with a Scope 1 CO₂e emissions intensity for field production activities that is 10 percent below the 2018 value. Compared to industry peers, the emissions intensity of our Permian Basin operations are among the best (as shown by the accompanying chart), and we believe this target will set a new standard for performance in the basin.

2. For our U.S. oil and gas operations, Occidental has established an indicator of estimated methane emissions relative to our oil and gas production (on a barrels of oil equivalent basis). This indicator supports the OGCI methane intensity goal while reflecting Occidental’s product mix, which is weighted more to oil production. We will establish a methane emissions intensity reduction target at the same time we set a direct CO₂e emissions intensity reduction target later this year.

3. As a new member of OGCI, Occidental supports the members’ effort to reduce the collective average methane intensity of their aggregated upstream oil and gas operations to below 0.25 percent by 2025 (from a 2017 baseline of 0.32 percent), with the ambition to achieve 0.20 percent.

4. Lastly, we have enhanced the 2019 executive compensation program’s sustainability component by including quantitative targets for the demonstrable advancement of commercial opportunities for CCUS projects and technology and expanding the component to comprise 10 percent of the target company performance portion of the annual cash incentive award for executive officers.

In aggregate, Occidental is developing a fulsome set of metrics and targets to help guide our efforts to reduce our impact on atmospheric concentrations of GHGs:

- Track total Scope 1 and Scope 2 GHG emissions for Occidental-operated assets, as well as emissions intensity for oil and gas direct emissions.
- Track methane emissions from our oil and gas operations on an intensity basis.
- Develop and disclose a 2030 direct CO₂e emissions intensity and a methane emission intensity target for our oil and gas operations, with interim milestones.
- Develop and disclose a metric that reflects Occidental’s overall impact on atmospheric GHG concentrations.
- Support OGCI members’ collective goal to reduce methane emissions intensity to below 0.25 percent by 2025.
- Limit the Scope 1 CO₂e emissions intensity for new U.S. oil and gas field production activities starting in 2020 to a level that is 10 percent below the 2018 value.
- End routine gas flaring by 2030.
Occidental is pleased to provide this update on our progress in defining and executing our strategy for sustaining our core business under low-carbon scenarios. As with last year’s report, this update is a product of much discussion and collaboration among the management team, our Board and many of our key investors and stakeholders. We express our appreciation for the considerable support we have received in shaping our strategy and framing this report, and look forward to continuing the dialogue.
450 Scenario A modeled energy supply/demand scenario developed by the International Energy Agency in its World Energy Outlook 2016. The scenario is based on an energy pathway consistent with the goal of limiting the global increase in temperature to 2°C by limiting concentration of GHGs in the atmosphere to around 450 parts per million of CO₂.

BBL Barrel (typically oil) — 42 gallons

BCF Billion cubic feet

BOE Barrel of oil equivalent is the energy released by burning one barrel of oil, and is used to express the energy contained in other hydrocarbon streams in barrels — for example, Occidental uses a conversion of 6,000 cubic feet of natural gas = 1 BOE.

CO₂ Carbon dioxide

CO₂ EOR Carbon dioxide enhanced oil recovery

CO₂e Carbon dioxide equivalent — obtained by converting a mixture of GHGs to a single number based on the global warming potential of each individual GHG in the mixture.

CCUS Carbon capture, utilization and sequestration

CDP A non-profit organization that manages a system for disclosing environmental impacts. Formerly known as the Carbon Disclosure Project [www.cdp.net](http://www.cdp.net)

CH₄ Methane

EPA U.S. Environmental Protection Agency [www.epa.gov](http://www.epa.gov)

ESG Environmental, Social and Governance

GHG Greenhouse gases — primarily comprised of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.

Henry Hub Henry Hub is a natural gas pipeline located in Erath, Louisiana that serves as the official delivery location for futures contracts on the New York Mercantile Exchange.

HES Health, Environment and Safety

IEA International Energy Agency [www.iea.org](http://www.iea.org)

IPIECA Originally, the International Petroleum Industry Environmental Conservation Association, but since 2002: “IPIECA, the global oil and gas industry association for environmental and social issues” [www.ipieca.org](http://www.ipieca.org)

MCF Thousand cubic feet

Method 21 A method of determining volatile organic compound leaks from process equipment sources such as, valves, flanges, and other connections, pumps, and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, agitator seals, and access door seals. [method 21](#)

Metric Ton (or Tonne) 1,000 kilograms (approximately 2,205 pounds)

MRV Monitoring, Reporting and Verification

NSPS OOOOa New Source Performance Standards for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 16, 2015, as found at U.S. Code of Federal Regulations, Title 40 Part 60 Subpart OOOOa.

NPV Net Present Value of revenues minus expenses using an annual discount rate of 10%

Permian Basin The Permian Basin is a hydrocarbon-bearing sedimentary basin largely contained in the western part of Texas and the southeastern part of New Mexico.

SASB Sustainability Accounting Standards Board [www.sasb.org](http://www.sasb.org)

Sustainable Development Scenario IEA scenario that integrates the objectives of three Sustainable Development Goals (SDGs): universal access to modern energy by 2030, stringent control of GHG emissions consistent with the objectives of the Paris Agreement (and generally consistent with the 450 Scenario), and a steep reduction in conventional air pollutant emissions.


TCFD Task Force on Climate-related Financial Disclosures [www.fsb-tcfd.org](http://www.fsb-tcfd.org)

WTI West Texas Intermediate — a type of crude oil that is the underlying commodity of the New York Mercantile Exchange’s oil futures contracts and a common benchmark for pricing crude oil.