Perspectives on Climate-Related Scenarios
Risks and Opportunities

October 2019

Marathon Petroleum Corporation
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GLOSSARY OF TERMS

barrel: 42 U.S. gallons — a common volume measure for crude oil and petroleum products

barrel of oil equivalent or boe: is a unit of energy based on the energy released by burning one barrel of crude oil or 5.8 million British thermal units.

bpcd: barrels per calendar day — the average of how much crude oil or other feedstock a refinery processes over a period of time, divided by the number of days in that period, typically 365 days (a common rate measure for petroleum refiners)

bpd: barrels per day — a common rate measure for crude oil and petroleum products

CO₂e: Carbon dioxide equivalent is a common unit of measurement converting all greenhouse gases to carbon dioxide. MPC calculates CO₂e emissions using the EPA factors identified in Equation A-1 in 40 CFR Part 98.

EII®: Energy Intensity Index, a measure proprietary to energy consulting firm HSB Solomon Associates LLC

ENERGY STAR®: A program of the U.S. Environmental Protection Agency recognizing energy efficiency. To achieve this status, applicants must perform in the top quartile for energy efficiency and have no unresolved environmental compliance actions from state or federal regulators.

ERM: Enterprise Risk Management

GHGs: Greenhouse gases, such as carbon dioxide and methane

IEA: International Energy Agency

IEA’s CPS: Current Policies Scenario

IEA’s NPS: New Policies Scenario

IEA’s SDS: Sustainable Development Scenario

LNG: Liquefied natural gas

LPG: Liquefied petroleum gases

Tonne or metric ton: 2,205 pounds

MPC: Marathon Petroleum Corporation

NGL: Natural gas liquid — a light hydrocarbon liquid often produced with natural gas

Scope 1 Emissions: All direct GHG emissions by a company. It includes fuel combustion, company vehicles and fugitive emissions.

Scope 2 Emissions: Indirect GHG emissions from consumption of purchased electricity, heat or steam

TCFD: Task Force on Climate-Related Financial Disclosures, formed by the Financial Stability Board (an international body that monitors and makes recommendations about the global financial system)
From the Chairman and Chief Executive Officer

Fellow shareholders,

It’s a pleasure for me to present the 2019 Perspectives on Climate-Related Scenarios, our third report that adheres to guidelines from the Task Force on Climate-related Financial Disclosures. This report not only further enhances our transparency; it also shows how we provide the many benefits of reliable, affordable energy to millions of people while also serving as responsible stewards of the air, land and water we all share.

We accomplish this through high operational standards across our entire business, and a commitment to excellence that includes our Board of Directors, executive leadership team, and the employees whose dedication makes it possible for us to achieve so much.

Having been a successful energy company for more than 130 years, we have long believed in the importance of providing our investors an assessment of our company’s future. We take this responsibility seriously, and in this report, we detail how we identify and manage climate-related challenges and opportunities. We evaluate our business plans and potential risks to our business using carbon-constrained scenarios established by the International Energy Agency. Our Board of Directors oversees these analyses, and our executive leadership team manages the risks under the Board’s direction.

We carefully evaluate and manage climate-related risks and opportunities in order to position Marathon Petroleum Corporation for long-term success. Our efforts to continually enhance our energy efficiency, and to reduce emissions, our freshwater withdrawal and greenhouse gas intensities, yield immediate results in terms of lower operating costs and less impact on the environment. These efforts — and many others throughout our enterprise — provide a foundation for us to be successful, even in a future characterized by carbon constraints and climate-related risks.

In the decades ahead, our growing world population will require more energy and petrochemicals to continue to enhance life’s possibilities across the globe. I invite you to read this report and learn more about how we continue positioning Marathon Petroleum to enhance life’s possibilities for our many stakeholders long into the future.

Sincerely,

Gary R. Heminger
Chairman and Chief Executive Officer
About MPC

Headquartered in Findlay, Ohio, Marathon Petroleum Corporation (MPC) is a leading, nationwide, integrated energy company. MPC is the nation’s largest refiner, with a capacity of more than 3 million barrels per day across its 16-refinery system. MPC owns the general partner and majority limited partner interests in MPLX LP, a midstream master limited partnership. MPC’s nationwide retail and marketing businesses include company-owned and -operated stores and branded locations.

Our Company

Refining and Marketing: MPC refines crude oil and other feedstocks at our 16 refineries in the West Coast, Gulf Coast and Mid-Continent regions of the United States, purchases refined products and ethanol for resale, and distributes refined products through transportation, storage and distribution services provided largely by our Midstream segment. We sell refined products to wholesale marketing customers domestically and internationally, buyers on the spot market, our Retail business segment and independent entrepreneurs who operate primarily Marathon® branded outlets.

Midstream: The Midstream segment transports, stores and distributes crude oil and refined products principally for the Refining and Marketing segment via refining logistics assets, pipelines, terminals, towboats and barges; gathers, processes and transports natural gas; and gathers, transports, fractionates, stores and markets NGLs. The Midstream segment primarily reflects the results of MPLX, our sponsored master limited partnership.

Retail: MPC sells transportation fuels and convenience products in the retail market across the United States through company-owned and -operated convenience stores, primarily at our approximately 4,000 Speedway® brand stores, and long-term fuel supply contracts with direct dealers, who operate locations mainly under the ARCO® brand.

Our Core Values

Our long-established core values are vital to our financial performance and to our relationships with stakeholders. Under the guidance and supervision of our Board of Directors, we pursue the highest standards of corporate responsibility by embedding these core values into our policies, practices and programs: Health and Safety, Environmental Stewardship, Integrity, Corporate Citizenship, and Inclusive Culture.
Note: Illustrative representation of asset map

(a) Includes MPC/MPLX owned and operated lines, MPC/MPLX interest lines operated by others and MPC/MPLX operated lines owned by others.
Introduction

Our annual Perspectives on Climate-Related Scenarios report follows the reporting guidelines established by the Task Force on Climate-Related Financial Disclosures (TCFD) formed by the Financial Stability Board, an international body of financial policymakers representing the world’s 20 largest economies. This report provides our stakeholders with an easy-to-read summary of how we identify and manage climate-related challenges and opportunities, including an overview of our governance and risk management structure and our strategy for dealing with potential transitional and climate-related risks.

This year, we have enhanced our metrics reporting to include more granularity around our Scope 1 and Scope 2 emissions. We also provide the results of a review of our business against a “less than 2-degree” or “low-carbon” scenario using scenarios developed by the International Energy Agency (IEA).

This report outlines significant challenges to meeting the world’s growing energy needs. A comprehensive strategy that incorporates efficient use of oil and natural gas, biofuels, nuclear and renewables will be needed to meet the climate goals being modeled while providing enough energy to fuel modern life. We are doing our part through our dedication to efficient, diversified, resilient operations. Our capacity to contribute to meeting the world’s future energy needs has increased substantially since our acquisition of Andeavor in 2018. This merger extended our integrated network of refining, midstream and retail assets from coast to coast and into Mexico. It also greatly increased the diversity of the businesses we operate, the people we employ and the communities where we are located. The acquisition also provides significant synergies that we anticipate will make our company more competitive. And, it gives us access into new markets, such as California, where lower carbon technologies and renewable fuels are being deployed through policies that are consistent with the less than 2-degree scenarios.

We believe our investors, and other interested stakeholders, will find that the extensive disclosures in this report, our Annual Report on Form 10-K, Sustainability Report and website align with the TCFD’s principles and demonstrate MPC’s financial strength, adaptiveness and resilience to climate-related risks.
Governance and Risk Management

MPC’s Board of Directors, its committees and executive management work together to ensure effective corporate governance. This governance includes a mature enterprise risk management (ERM) program to identify and manage material risks, including climate-related risks.

Board Oversight of Climate-Related Risks and Opportunities

Climate-related risks and opportunities represent a key focus area for our Board. Our Board members have significant expertise and experience in the energy sector, finance, economics, operations and public policy, which allows them to effectively analyze risks and the strategies management employs to mitigate those risks.

While management has primary responsibility for managing risk, the Board is responsible for risk oversight. The Board reviews key risks associated with our strategic plan, including emerging risks, at a designated strategy meeting annually and on an ongoing basis throughout the year. Our Board of Directors has four standing committees that provide oversight: Audit, Compensation, Corporate Governance and Nominating, and Sustainability.

The Board formed the Sustainability Committee in 2018 to allow greater focus on climate change and other environmental, social and governance (ESG) topics that could have an impact on the company. More information on the Sustainability Committee and other Board committees is available at https://www.marathonpetroleum.com/About/Board-of-Directors/. The table below sets forth the principal oversight functions of each Board committee.

<table>
<thead>
<tr>
<th>Audit Committee</th>
<th>Compensation Committee</th>
<th>Corporate Governance and Nominating Committee</th>
<th>Sustainability Committee</th>
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</thead>
<tbody>
<tr>
<td>• Regularly reviews risks associated with financial and accounting matters, as well as those related to financial reporting.</td>
<td>• Reviews our compensation programs to ensure they do not encourage excessive risk-taking.</td>
<td>• Develops and oversees our Corporate Governance Principles.</td>
<td>• Reviews and assesses effectiveness of health, environment, safety and security programs, performance metrics and audits.</td>
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<tr>
<td>• Monitors compliance with regulatory requirements and internal control systems.</td>
<td>• Reviews our compensation programs and succession plans to confirm our practices are appropriate to support the retention and development of the employees necessary to achieve our business goals and objectives.</td>
<td>• Reviews shareholder communications and other initiatives, including those related to ESG issues.</td>
<td>• Reviews the company’s strategy on climate change and other ESG-related issues.</td>
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<tr>
<td>• Oversees our enterprise risk management (ERM) process.</td>
<td></td>
<td>• Reviews the qualifications and makeup of the Board and candidates for the Board.</td>
<td>• Oversees our Perspectives on Climate-Related Scenarios report and our annual Sustainability Report.</td>
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</table>
Executive Leadership’s Role in Managing Climate-Related Risks

Our executive leadership is responsible for managing risk under the oversight of the Board. Our strong ERM process is our primary tool for identifying, assessing and managing risk, as well as monitoring the performance of risk mitigation strategies. The ERM governance process starts with the executive sponsorship of our chairman and CEO and our executive vice president and CFO. More importantly, all levels of the organization are accountable for risk management. For instance, we have an enterprise risk manager who works with officers and senior managers to confirm we have the necessary programs in place to manage risk and identify emerging risks. The Board and the executive leadership team frequently discuss various ERM topics. Material risks to our company are disclosed in the Risk Factors section of our Annual Report on Form 10-K that is filed with the Securities and Exchange Commission.

Carbon emissions policy and emerging technology have been identified as enterprise-level risks that are regularly reviewed as part of our ERM process and with our executive management and the Board’s Sustainability Committee. To aid in managing climate-related risks and identifying opportunities, our executive leadership has established several internal committees that are developing integrated strategies to effectively predict and manage different aspects of climate-related risks and opportunities.

STRATEGIC STEERING COMMITTEE
Provides a routine forum for presentations by subject matter experts (both internal and external) to executive leadership and discussion of topics that affect the long-term strategy of the company. Such topics include business and market environment updates, political and regulatory trends, and potential market disruptors (technology or otherwise).

HES&S MANAGEMENT COMMITTEE
Meets quarterly with key health, environmental, safety and security (HES&S) personnel and leadership from throughout our company to evaluate performance and discuss strategic HES&S, corporate citizenship and public policy issues. This interactive forum ensures executive leadership remains informed and up to date on HES&S and corporate citizenship matters affecting the company, including climate-related matters, and provides a platform to discuss these issues with HES&S leadership.

CLIMATE POLICY STEERING COMMITTEE
Focuses on policy-related issues such as emerging environmental regulations, consumer mandates, biofuel mandates, methane regulations, cap and trade systems, carbon taxes and other stakeholder concerns that could affect our business.

EMERGING TECHNOLOGY STEERING COMMITTEE
Focuses on technical issues surrounding emerging technologies that affect carbon emissions such as automobile engine efficiency, carbon capture and sequestration, renewable energy and electric vehicles to understand how technology is advancing and if or when a potential significant market penetration could occur.

RENEWABLE ENERGY STRATEGY TEAM
Focuses on business development opportunities associated with renewable fuels and renewable energy.
Climate-Related Risks, Business Planning and Capital Allocation

Climate-related risks assessed through our ERM process are some of the many considerations in our business planning processes. Our economists use information from our various internal committees, along with market data and projections from sources such as the IEA and U.S. Energy Information Administration (EIA), to develop various long-term price forecasts that form the basis for capital allocation. Using this data, we apply a risk-based capital allocation process with higher return-on-investment (ROI) thresholds for business segments with the greatest financial and regulatory uncertainty. Business segments that would be most affected by high carbon pricing, like our refineries, must achieve higher internal ROI thresholds than segments that would be less affected by carbon pricing, like our midstream or retail assets.

Our capital allocation strategy is driving investment decisions that are consistent with the IEA’s scenario projections, including the Sustainable Development Scenario (SDS). For instance, due to its lower carbon intensity as compared to coal, the IEA projects a significant increase in natural gas production is needed over the next 10 years to quickly displace coal in the power sector. The IEA also projects that natural gas will become the dominant fuel used worldwide by 2040 in its SDS. Our capital allocation strategy aligns well with these projections. Since 2015 we have invested more than $17 billion to acquire and organically grow our natural gas and natural gas liquid (NGL) assets. We are now one of the largest natural gas gathering and processing companies in the United States.

Within our Refining and Marketing segment we are focusing investment on sustaining capital with an emphasis on upgrading capabilities, yield flexibility and conversion capacity so that we maintain flexibility to efficiently produce the refined products most in demand worldwide. Over the past five years our refineries have invested hundreds of millions of dollars on projects that have reduced the carbon intensity of our operations and made our operations more competitive worldwide. We are also allocating roughly $450 million to convert our Dickinson refinery into a renewable diesel refinery capable of producing up to 12,000 bpd of renewable diesel. This project is ongoing with an expected start-up date in late 2020. This investment strategy is also consistent with IEA’s projections, which indicate an increase in biofuels production and increased competitiveness within the refining industry.

In 2018, our midstream facilities processed 7.5 billion standard cubic feet per day of natural gas, which represents 10.1% and 2.1% of the natural gas demand within the United States and worldwide, respectively.

Source: MPC 2018 Form 10-K and IEA, World Energy Outlook 2018
Climate Scenario Planning

As part of our ERM process, we conduct a review of our business portfolio against several future scenarios using projections from the IEA. We also rely on data from HSB Solomon Associates to determine whether any of our refining assets are at risk under the various scenarios. The results of this review are reported to the Board’s Sustainability Committee and presented in this report.

Annually, the IEA publishes its World Energy Outlook that includes several different scenarios. These scenarios provide a glimpse at the possible future energy landscape, with the aim of providing governments, companies and other stakeholders with a range of potential outcomes to consider.

The outcomes modeled by the IEA range from business as usual to deep decarbonization. They also model different sustainability goals, such as limiting global temperature rise to below 2 degrees Celsius, ensuring all people have access to affordable and reliable modern energy, and curbing air pollution.

These scenarios provide our company with several versions of the future to consider so we can plan ahead and adjust appropriately as the future unfolds. In this year’s report, we apply the following three hypothetical scenarios:

- **Current Policies Scenario (CPS)** — considers only those climate policies that have been formally adopted by governments. This scenario provides a comparison point against which new policies can be assessed.

- **New Policies Scenario (NPS)** — the central scenario from IEA that aims to provide a sense of direction for the energy sector. It incorporates existing energy policies, as well as an assessment of the results likely to occur from implementation of announced intentions, notably those in climate pledges submitted for the Paris Climate Agreement (COP21).

- **Sustainable Development Scenario (SDS)** — an aspirational construct of policy-driven improvements with multiple goals, including: 1) to ensure universal access to affordable, reliable, sustainable and modern energy services by 2030; 2) to substantially reduce air pollution; and 3) to limit worldwide temperature increases to less than 2 degrees Celsius.
Outlook for Energy through 2040

WORLD ENERGY DEMAND

In recent years, the world has significantly increased its energy efficiency. Importantly, this has been accomplished while also providing access to energy for more people. The global energy landscape will continue to evolve over the next 30 years as the population increases and standards of living rise in many developing nations. An estimated 2 billion more people will create a need for additional energy to deliver electric power to light and cool homes, gas to heat homes, clean cooking fuel to provide nourishment, and fuel for transportation.

The IEA's projections factor all these realities into its three principal scenarios while balancing carbon emissions. The overall takeaway is that a diversified energy portfolio, along with continued advancements in energy efficiency, will be required to meet future energy needs and the climate goals being modeled. While oil and gas will remain the dominant sources of energy for the foreseeable future, the scenario projections indicate that the oil markets will continue to become more competitive, favoring the most efficient producers. The most dramatic shift is expected to involve moving from coal to gas, renewables and bioenergy.

IEA Energy Projections for 2040 at a Glance

The IEA projects a shift away from coal in favor of renewables and nuclear with oil and gas providing approximately 50% of total energy demand under all three scenarios.

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<tr>
<td>Crude Oil</td>
<td>Crude Oil</td>
<td>Crude Oil</td>
<td>Gas</td>
</tr>
<tr>
<td>32%</td>
<td>29%</td>
<td>28%</td>
<td>25%</td>
</tr>
<tr>
<td>Coal</td>
<td>Gas</td>
<td>Coal</td>
<td>Crude Oil</td>
</tr>
<tr>
<td>27%</td>
<td>25%</td>
<td>22%</td>
<td>23%</td>
</tr>
<tr>
<td>Gas</td>
<td>Coal</td>
<td>Bioenergy</td>
<td>Other Renewables</td>
</tr>
<tr>
<td>22%</td>
<td>25%</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>Other Renewables</td>
<td>Bioenergy</td>
<td>Bioenergy</td>
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<tr>
<td>10%</td>
<td>5%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>Other Renewables</td>
<td>Nuclear</td>
<td>Nuclear</td>
</tr>
<tr>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
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<tr>
<td>Hydro</td>
<td>Nuclear</td>
<td>Hydro</td>
<td>Nuclear</td>
</tr>
<tr>
<td>3%</td>
<td>5%</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Other Renewables</td>
<td>Hydro</td>
<td>Hydro</td>
<td>Hydro</td>
</tr>
<tr>
<td>2%</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
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Source: IEA, World Energy Outlook 2018

*Latest year available
SCENARIO PROJECTIONS FOR PETROLEUM-BASED LIQUIDS

The IEA projects that worldwide demand for petroleum-based liquids will remain strong through 2040, indicating a 27% increase under its CPS and a 12% increase under its NPS. The SDS speculates demand would remain flat through 2025 followed by a 26% decline by 2040. The following provides insight into each of the main economic sectors that influence refined liquids demand:

Industry and Petrochemicals: Much of the expected efficiency gains in the global transportation sector will come from reducing the weight of vehicles, trucks, planes and ships. This will be accomplished by increasing the amount of lightweight and durable petroleum-based plastics and composite materials in vehicles. Electric vehicles, for example, have a high percentage of petroleum-based materials to offset the weight of the batteries. Petroleum-based chemicals are also used in countless other consumer products we use every day. As a result, the demand for petrochemical feedstocks is expected to increase by as much as 40% through 2040 even under the IEA’s carbon-constrained SDS. Page 14 shows a few of the many petroleum-based products we use daily.

Aviation and Shipping: There are currently few viable fuel substitution options that exist for oil in aviation and shipping; thus, the IEA projects an increased demand of approximately 5 million bpd under its NPS. Due to the expected increases in transportation miles traveled, this increase would be much higher without planned efficiency improvements. Efficiency improvements can be realized through engine and vehicle design along with logistics optimization. The IEA also models a slight reduction in oil demand from the sector under its SDS.
Road Transport: Motor vehicle use is one of the main drivers of future petroleum-based liquids demand. Today there are approximately 1.1 billion passenger vehicles on the road worldwide, nearly all fueled by oil. The IEA expects the global passenger car fleet could grow another 880 million vehicles by 2040. With nearly 2 billion passenger vehicles on the road in 2040, energy demand for transportation fuel will grow significantly without further advances in fuel efficiency. There are several factors that influence future demand for gasoline and diesel that are modeled in IEA’s projections: 1) worldwide fuel efficiency of vehicles; 2) electric vehicle penetration; and 3) advanced biofuels production breakthroughs. The NPS assumes that there will be significant increases in all three of these variables; however, with the increase in the number of vehicles and miles traveled, demand for petroleum-based fuels could still see a slight increase. The carbon-constrained SDS models a decline in gasoline and diesel demand through 2040, based on even larger increases of these three factors. However, even under the carbon-constrained SDS, petroleum-based fuels would still continue to provide 60% of the total energy for transportation.6

IEA Transportation Energy Projections for 2040 at a Glance

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<tr>
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<tbody>
<tr>
<td><strong>Petroleum-Based Fuels</strong></td>
<td><strong>Petroleum-Based Fuels</strong></td>
<td><strong>Petroleum-Based Fuels</strong></td>
<td><strong>Petroleum-Based Fuels</strong></td>
</tr>
<tr>
<td>92%</td>
<td>88%</td>
<td>82%</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Other Fuels</strong></td>
<td><strong>Other Fuels</strong></td>
<td><strong>Other Fuels</strong></td>
<td><strong>Other Fuels</strong></td>
</tr>
<tr>
<td>4%</td>
<td>5%</td>
<td>8%</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Biofuels</strong></td>
<td><strong>Biofuels</strong></td>
<td><strong>Biofuels</strong></td>
<td><strong>Biofuels</strong></td>
</tr>
<tr>
<td>3%</td>
<td>4%</td>
<td>6%</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td><strong>Electricity</strong></td>
<td><strong>Electricity</strong></td>
<td><strong>Electricity</strong></td>
</tr>
<tr>
<td>1%</td>
<td>2%</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

*Petroleum-based fuels includes gasoline, diesel, jet fuel and marine fuel.
**Other fuels include compressed natural gas and hydrogen.

The IEA indicates that oil will remain the dominant energy source in the transportation, aviation and shipping sectors under all three scenarios.

Source: IEA, World Energy Outlook 2018
Petroleum Makes Modern Life Possible

Petroleum-based products are ubiquitous in modern life. These uses and more are part of the reasons petrochemical feedstock demand is projected to rise over the next decades.
SCENARIO PROJECTIONS FOR NATURAL GAS

The IEA projects demand for natural gas will increase under all three of its scenarios, even the SDS. Increased demand comes primarily from higher demand in the power, industrial and transportation sectors. The NPS also projects U.S. natural gas production will increase by 41% through 2040, resulting from increased shale gas production and liquefied natural gas (LNG) exports. During this same period, demand is expected to increase significantly for non-methane fractions of natural gas, such as ethane, propane, butane, pentane, natural gasoline and condensates. These NGLs are becoming important feedstocks for the petrochemical industry (e.g., ethane cracking), while condensate can be easily processed at refineries. Increased fractionation of liquefied petroleum gases (LPGs), like propane and butane for clean cooking fuel, is also a key goal of the SDS. Developing economies in Asia and Africa represent the bulk of the growth in residential LPG demand, but these regions do not have sufficient refining capacity or indigenous NGL production to meet their needs. Thus, a large share of demand must be met by imports from the United States.

The Hopedale gas processing complex in Jewett, Ohio.

Source: IEA, World Energy Outlook 2018
SCENARIO PROJECTIONS FOR BIOFUELS

The advancement of renewable biofuels is a key component of the IEA’s climate scenarios. Biofuels are liquid fuels derived from biomass or waste feedstocks and include ethanol, biogasoline, biodiesel and renewable diesel. Ethanol and biodiesel are typically blended with petroleum fuels (gasoline and diesel), whereas renewable diesel can be used as a drop-in substitute for conventional diesel. The IEA projects that biofuels demand will continue to grow through 2040 under all three of its scenarios.

Because biofuels are sourced from biomass materials (e.g., corn, soybeans), the carbon released from burning these fuels is considered to be offset by the carbon that was removed from the atmosphere by the biomass used to produce the fuel. However, biofuels are not net-zero emission fuels because it takes energy to turn biomass material into fuel. To produce corn ethanol, it takes energy to plant and harvest corn, transport the kernels to the ethanol plant, refine the material into ethanol, and transport and deliver the final product to consumers. The carbon emissions associated with each point in the value chain are added together to determine the carbon intensity (CI) of the fuel. Biofuels generally have a lower CI value than petroleum-based fuels, but the CIs of fuels can vary widely because of different levels of intensity in land use practices and manufacturing processes. An example of this is provided on the following page. Being more carbon efficient anywhere along the life cycle continuum will result in a lower CI value (e.g., more energy efficient refining or transport).
Comparing the Carbon Intensity (CI) of Different Fuels

**Renewable Diesel**
- Land use change and farming corn/soy
- Corn/soy oil collection and transport
- Transport of oil to refinery
- Biorefining
- Transportation/Blending
- Combustion

**Corn Ethanol**
- Land use change and farming corn
- Transportation
- Biorefining
- Transportation/Blending
- Combustion

**Gasoline**
- Oil Extraction
- Transportation
- Refining
- Transportation
- Combustion

Combustion emissions are considered offset by the carbon previously removed from atmosphere by the plant material.

- gCO2e/MJ = grams of carbon dioxide per megajoule of energy
- Source: California Air Resources Board, Approved Pathways as of Aug. 12, 2019.
Summary of Climate-Related Risks and Opportunities

Part of performing the scenario analyses involves identifying relevant climate-related risks and opportunities.

**POTENTIAL RISKS**

- The demand for traditional transportation fuels could decrease in many countries, including the U.S., due to government regulation, increased fuel efficiency of internal combustion engines, increased market share of electric vehicles, and increased biofuels consumption in the transportation fleet.
- Additional greenhouse gas (GHG) regulations could be implemented, such as requirements to further reduce methane emissions from our midstream assets or a carbon tax or similar effort that increases the costs of our products, thereby reducing demand.
- We could face increased climate-related litigation with respect to our operations or products.
- Physical risks, such as intense weather patterns, sea-level rise or water stress, have the potential to impact our facilities.
- Transitional risks could occur, such as a shift in consumer preferences that affect demand.
- While we do not conduct hydraulic fracturing operations, we do provide gathering, processing, fractionation and logistics services for natural gas, oil and NGLs produced by others. We also purchase crude oil and natural gas as feedstocks and fuel for our refineries. As a result, any prohibitions on hydraulic fracturing or increased regulation of the upstream oil and gas industry could affect our business.
- Increased regulations and litigation surrounding pipeline construction and siting, including consideration of GHG emissions downstream of pipeline operations, could have a negative impact on our ability to transport our feedstock and products.

**POTENTIAL OPPORTUNITIES**

- Worldwide and domestic demand for natural gas and NGLs is expected to increase through 2040, even in the SDS. This higher demand is driven by increased use in the power, petrochemical, industrial and transportation sectors.
- Worldwide demand for petrochemical feedstocks is expected to increase through 2040. The IEA notes there are few substitutes for oil- and gas-based feedstocks for the petrochemical industry.
- Energy-efficiency requirements for facilities are projected to increase. We consider energy efficiency to be a core business function and opportunity, because it reduces costs while reducing GHG emissions, enhancing our competitiveness.
- Through 2040, gasoline and diesel demand is expected to increase in many developing countries. Our assets are favorably located for export to these countries.
- Worldwide and domestic demand for biofuels in the transportation fleet is expected to increase through 2040, especially in the SDS.

Ray Brooks, Executive Vice President of Refining, accepts the ENERGY STAR Partner of the Year Award from the U.S. EPA.
Results of the Climate-Related Scenario Analyses

We conducted scenario analyses of climate risks and opportunities across our three business segments. The detailed analyses below indicate our overall business strategy is consistent with the IEA’s projections, and we are continuously evaluating risks for our business segments and implementing strategies to effectively manage these risks. The significant growth we have accomplished over the past five years has diversified our company and provided an integrated, coast-to-coast network of refineries, gas plants, biofuels plants, logistics assets and retail outlets.

Each business segment has unique challenges and opportunities. For instance, natural gas and NGL demand are expected to grow even under the IEA’s carbon-constrained SDS, while demand for some refinery products, such as gasoline, are expected to decline and others, such as diesel and petrochemical intermediates, are expected to grow.

In other words, IEA’s projections indicate an expansion of the midstream sector and a potential contraction of the refining sector. Our capital investment strategy aligns well with both possibilities. We continue to build new natural gas processing capacity in our Midstream segment, and we target capital investment at our refineries toward upgrading capabilities, yield flexibility and conversion capacity so that we maintain flexibility to efficiently produce the refined products most in demand. As we highlighted in the Governance and Risk Management section starting on Page 7, we also maintain higher return-on-investment thresholds within our Refining and Marketing segment, which naturally shifts an increasing amount of capital toward midstream gas projects that have lower thresholds. To date, we have invested more than $17 billion to acquire and organically grow natural gas and NGL assets primarily located in the Northeast and Southwest United States. Through our master limited partnership, MPLX, we are now one of the largest natural gas gathering and processing companies in the United States.

This strategy has significantly decreased the carbon intensity of our operations over the past five years as more and more of our manufacturing inputs shift toward lower carbon intensity fuels. For instance, in 2014, natural gas gathering and processing was not part of our portfolio. By 2016, the throughput of our natural gas processing plants made up 30% of our total throughput on a normalized barrel of oil equivalent basis. Today, gas processing accounts for 35% of our total throughput.

MPC Manufacturing Inputs and GHG Intensity* (direct and indirect GHG emissions)

*Includes data from facilities that MPC may have not yet owned, so that performance can be compared across the same asset base over time. Assets included are those that MPC owned/operated as of Dec. 31, 2018.
**2014 data includes emissions from gas gathering and processing operations that were not purchased until 2015.
REFINING AND MARKETING

Worldwide Refining Projections

• Net refining capacity is expected to increase by another 12.8 million bpd through 2040. Most of the capacity increases are expected to occur in the Middle East, China, India and Southeast Asia. The largest decreases in capacity are projected in Europe, Japan and Korea. Capacity in the United States, the world’s largest refining center, is expected to remain relatively flat.

• Demand for refined products is expected to be approximately 91.6 million bpd, or 82% of projected capacity in 2040. Considering required downtime, the IEA projects refining capacity could exceed demand by 14.2 million bpd in 2040, putting some refineries at risk of closure. Europe has the highest percentage of capacity at risk (34%), followed by Japan and Korea (27%), Russia (22%), North America (13%) and China (9%), according to the IEA’s projections.

• Under the NPS, demand for gasoline is expected to drop slightly, and heavy fuel oil demand is expected to decrease substantially as a result of the International Maritime Organization (IMO) sulfur regulations. Demand for other refined products, such as petrochemical feedstocks and distillates, is expected to increase. This indicates a slight increase in total refined product demand.

• Under the SDS, the IEA modeled reduced demand for all transportation fuels, assuming regulations and technology will increase the efficiency of the transport, maritime and aviation sectors, along with a significant increase in the use of advanced biofuels and significant electric vehicle use.

North American Refining Projections

• North American refining is expected to experience a modest capacity decrease of 400,000 bpd through 2040. Please note, however, that IEA made this projection prior to Philadelphia Energy Solutions’ announcement that it intended to permanently close its 335,000 bpd refinery in Philadelphia, Pennsylvania, in June 2019.

• The IEA notes that despite the projected decline in gasoline demand in the United States over the long term, U.S. refiners benefit from a high level of complexity, meaning they have a greater capability to produce the refined products most in demand globally. U.S. refineries also have an ample supply of domestic feedstock, lower energy costs and are favorably situated such that they can readily export to regions with increased demands for imported transportation fuels and other refined products (Africa, Asia, Europe and Latin America).

• The IEA also notes an increasing gasoline surplus over the long term could cause higher cost refiners, particularly those along the East Coast of the United States, to face challenges in sustaining their utilization rates.

Refining — Potential Risks and Opportunities

The primary climate-related risk to our Refining and Marketing segment is decreased consumer demand for traditional transportation fuels in many developed countries, including the United States, due to higher vehicle efficiency standards, increased market share of electric vehicles, replacement with biofuels and increased regulatory costs. As we demonstrate on the next page, we expect our Refining and Marketing segment to remain strong even under the carbon-constrained SDS. The integration of Andeavor’s refineries into our asset base is providing significant synergies that are expected to exceed $1.4 billion annually by year-end 2021. The integration also brings significant capability to increase exports of our refined products to Africa, Latin America, Europe and Asia, where imports are expected to grow.
Resiliency of U.S. Refining

Operating costs are critical to the financial viability of a petroleum refinery. These operating costs depend on a number of factors, including available feedstocks, energy costs, refinery size and complexity, utilization rates, maintenance costs and labor rates. Energy and feedstock costs represent the largest share of overall operating costs.

The U.S. refining sector benefits from lower energy and feedstock costs compared to its global competitors due to robust domestic crude and natural gas production. As reflected in the graph to the right, lower energy and feedstock costs translate into lower overall production costs per unit of product. These favorable macroeconomic differentials are greater than the regional transportation costs, enabling the U.S. refining sector to export products to other countries and regions, including Asia, Latin America, Africa and Europe. As shown to the right, this is confirmed by steadily increasing exports of U.S. transportation fuels.

Consistent with our internal forecasts, the IEA projects the United States will continue to maintain lower energy prices through 2040 compared to other global regions, even in the SDS. As a result, we believe the U.S. refining sector is positioned to maintain a cost advantage over other regions of the world.

The U.S. refining sector has the further advantage of a higher level of technological complexity compared to other regions of the world. This provides the U.S. refining sector with greater capability to adjust output to the products most in demand worldwide. This is a competitive advantage because extensive capital deployment is not required to begin producing different refined products (such as distillates and petrochemical feedstocks vs. gasoline). Further, U.S. refineries are generally located near petrochemical facilities, providing synergies for easy delivery of petrochemical feedstocks, reducing transportation costs and emissions. As a result, we expect U.S. refining capacity utilization to remain relatively high compared to other regions as the global refining sector adjusts output to match the reductions in transportation fuels projected by the NPS and SDS.
We retained HSB Solomon Associates LLC (Solomon) to evaluate the resiliency of our refineries against the projections in the IEA’s NPS and SDS, as they were presented in the World Energy Outlook 2018. Solomon is uniquely qualified to perform this analysis because it has cost and production data for approximately 85% of worldwide refineries through its biennial Fuels Studies. Solomon considered the following key assumptions in its analysis:

- Refineries with high operating costs, low utilization and low net cash margins would cease operation in lieu of the entire refining sector operating at lower utilization rates.
- Regional trade flows of transportation fuels would favor certain regions over others. Other factors, such as refineries serving niche markets, were also considered.
- Refinery-specific production costs and other performance data were utilized from Solomon Associates’ 2018 worldwide Fuels Study.
- The transportation fuel demands projected in the NPS and SDS from the World Energy Outlook 2018 were used.
- Consideration was also given to refineries in countries that may receive government subsidies to stay running regardless of economic pressures.

Solomon’s analysis indicates that MPC’s Refining and Marketing segment would remain cost competitive, even in the carbon-constrained SDS. This is due to the U.S. cost advantages discussed in the previous section, the location of assets and the markets they serve, as well as our cost competitiveness and integrated business model relative to other U.S. refiners. As shown on the graph on Page 21, there is a wide variation in refinery costs within North America and worldwide. We will continue to evaluate each of our refineries as the future unfolds to identify further risks and opportunities that could affect viability.
We will continue to implement strategies that complement the IEA’s demand projections. Some examples of commitment include:

- The acquisition of Andeavor resulted in a nationwide interconnected footprint with significant synergies for procuring advantageous feedstocks and product placement domestically and internationally, resulting in maximum refinery utilization. Our refining utilization rates are higher than the United States and world averages. We expect this trend will continue as other regions, such as Latin America and Europe, continue to curtail production expanding our export opportunities.

- We have invested hundreds of millions of dollars to expand our capabilities to export from our U.S. Gulf Coast and West Coast refineries and terminals. Currently, we are able to export approximately 520,000 bpd of light products. Future planned export expansion projects will increase our capability up to 720,000 bpd of light product, which is about one quarter of our light product production. This capability provides us with added flexibility to market more of our gasoline and distillate in other regions such as Mexico, Asia, Central and South America, Europe and Africa.

- With the highest resid upgrading and distillate hydrotreating capacity of all U.S. refiners, we believe we are well positioned to take advantage of producing IMO-compliant fuels beginning in 2020, when the IMO reduces the sulfur specification of bunker fuel from 3.5% to 0.5%.

- Our overall weighted Nelson Complexity Index score is higher than the world average, and by operating our refineries as an integrated system, we are able to optimize this complexity to target output toward higher-demand products where they are most cost effective to produce within our system.

We believe our analysis shows that our refining operations are in a superior position, as compared to other regions of the world, leading to further exports as the global refining sector adjusts output to match the reductions in transportation fuels projected by the NPS and SDS. Given the projected viability of our refining operations in a hypothetical lower-carbon economy, other facets of our operations stand to similarly benefit. For example, our logistics assets — including the storage and transportation assets in our Midstream segment — would continue to be integral to our refining business, even in the SDS.
MPC’s Renewable Fuels Program

The advancement of biofuels and other lower-carbon fuels is a substantial market shift projected by the IEA. This is because biofuels generally have a lower carbon intensity (CI) than petroleum-based fuels. As a result, an equal amount of energy produced from biofuels will generally release less carbon to the atmosphere than the same amount of energy from fossil fuels when the full life cycle of the fuel is considered. Demand projections indicate biofuels production could increase by more than 300% over the next 20 years.

The U.S. is the world leader in the production and use of biofuels, currently accounting for 48% of biofuels used worldwide. The primary reasons for biofuels demand in the United States have been the federal Renewable Fuel Standard (RFS), which mandates volumes of different types of biofuels to be placed into the overall U.S. fuel market, and the California Low Carbon Fuel Standard (LCFS), which mandates an overall reduction of carbon intensity across all transportation fuels sold within the state. Compliance is achieved by blending or replacing a portion of the traditional transportation fuel pool with renewable fuels, or by obtaining credits to meet the regulatory targets. Tax credits are also available in the United States to offset the higher production costs of certain biofuels. For instance, biodiesel on average is around $0.80 per gallon more to produce than conventional diesel based on the price of feedstocks (e.g., soybeans).

The opportunities associated with advancing renewable fuels are an extensive part of our short- and long-term business strategy. We have made significant investments in the production, research and development of biofuels, along with related wholesale marketing and retail strategies. In 2018, we delivered nearly 2.2 billion gallons of biofuels to consumers.

Much of our strategy relates to compliance with existing regulations that are consistent with those modeled in the SDS, a less than 2-degree scenario.

For instance, approximately 20% of our refining capacity and marketed transportation fuels are subject to the California Cap-and-Trade program (AB 32) and California LCFS program. To meet these regulatory requirements, we are making investments to reduce the carbon intensity of our California refineries, along with significant investments in biofuels production to manufacture lower-carbon transportation fuels. Elements of our strategy include:

**Ethanol:** A joint venture between MPC and The Andersons produces more than 410 million gallons of ethanol each year, and we blend more than 2 billion gallons of ethanol into the gasoline that we market and sell. In addition, we also capture over 175,000 tonnes of carbon dioxide per year from these ethanol plants that are sold for use in industrial applications and the beverage industry.

**Biodiesel:** MPC produces 80 million gallons of biodiesel annually at our Cincinnati biodiesel plant, and we blend more than 95 million gallons of biodiesel into the diesel fuel that we market and sell.

**Renewable Diesel:** We are investing roughly $450 million to convert our Dickinson, North Dakota, refinery into a 12,000 bpd biorefinery that will process corn and soybean oil to produce renewable diesel. We intend to sell the renewable diesel into the California market to comply with the California LCFS.

**Biocrude:** In 2020, we plan to begin purchasing a crude oil substitute from Fulcrum BioEnergy, Inc. that is derived from gasifying presorted separated municipal solid waste. We are investing more than $9 million in our Martinez refinery to allow us to store the feedstock on-site and feed it into our existing fluid catalytic cracking (FCC) unit. The project will result in a carbon intensity reduction and can generate LCFS credits.
**Advanced Biofuels Research:** The IEA notes that advanced biofuels created from waste oils, animal fats and lignocellulosic material, such as agricultural and forestry residues or municipal wastes, will need to be produced at scale to match the biofuel volumes modeled in the SDS. We are proud to be supporting advanced biofuels research and development through our subsidiary, Virent, Inc.

Virent is a wholly-owned subsidiary of MPC working to commercialize a novel process — referred to as the BioForming® process — for converting biobased feedstocks into renewable fuels and chemicals. The company was founded in 2002 and acquired in 2016. Since its inception, Virent has invested over $150 million in research and development of advanced biofuels and we continue to invest over $10 million per year on further development of the technology. One of its products, BioFormate®, is similar to petroleum reformate, albeit derived from biomass. It can be processed into biorenewable products, including gasoline and jet fuel blending components, bioparaxylene (a key raw material for the production of polyester fibers and packaging), and biobenzene for use in renewable plastics.

The company achieved a significant milestone in 2018 by completing a year-long run of its demonstration plant — converting sugar from sugarcane into BioFormate. Components of the BioFormate are now being used for jet fuel certification and to produce polyester for market development. Virent also previously achieved EPA certification of its biogasoline as a blending product in petroleum-based fuels and has provided fuel components for use by Scuderia Ferrari in Formula One racing.

We continue to make progress on our demonstration unit to further develop the Virent technology toward a full-scale application. Fuels produced through Virent’s process have carbon intensities about half the levels of traditional petroleum-based fuels and chemicals. Virent’s fuels are also unique in the biofuels space because Virent’s hydrocarbon molecules are the same as those found in today’s petroleum products, but from renewable feedstocks. These molecules can be dropped into existing infrastructure for the production of chemicals or blended in high concentrations to make premium quality gasoline, diesel or jet fuel.
MIDSTREAM

IEA Midstream Projections

The IEA continues to project increased demand for natural gas and NGLs through 2040 under all three of its scenarios. Notably, the IEA raised its projections in the NPS by almost 100 billion cubic meters (bcm) compared to the previous year. This is mainly due to coal-to-gas switching in developing economies like China and India.

- Natural Gas: Through 2040, the NPS and SDS project an increase in worldwide natural gas demand of 43% and 11%, respectively. The increase comes from higher demand in the power, industrial and transportation sectors. The NPS also projects U.S. natural gas production will increase by 41% through 2040. This jump results from increased shale gas production and LNG exports.11

- Natural Gas Liquids: Demand is expected to grow through 2040 for the non-methane fractions of natural gas, such as ethane, propane, butane, pentane, natural gasoline and condensates. NGLs are becoming important feedstocks for the petrochemical industry (e.g., ethane cracking), while condensate can be easily processed at refineries. Increased fractionation of LPGs like propane and butane for clean cooking fuel, is also a key goal of the SDS. Developing economies in Asia and Africa represent increased demand for residential LPGs, but these regions do not have sufficient refining capacity or indigenous NGLs to meet their needs. Thus, a large share of demand must be met by imports from the United States.

- Petrochemical Feedstocks: Worldwide demand for petrochemical feedstocks is projected to increase by 40% and 52% through 2040 under the IEA’s SDS and NPS, respectively. In the short to medium term, the U.S. petrochemical industry is projected to experience more than 20% of the worldwide demand growth in petrochemical feedstocks due to the availability of low-cost natural gas and NGLs.

- Product Exports: The strong growth in U.S. crude, natural gas and NGL production will require additional infrastructure to link supply to global demand markets. Pipelines and processing, fractionation and export facilities will be needed to allow U.S. producers to realize full product value.

Midstream — Potential Risks and Opportunities

Our Midstream segment, which includes MPLX, faces these primary climate-related risks:

- Increased capital necessary to grow our natural gas business, increased methane emission regulation and reduced demand for traditional transportation fuels that are transported and stored by our logistics assets, including pipelines, terminals and marine fleet.

- While we do not conduct hydraulic fracturing operations, we do provide gathering, processing and fractionation services with respect to natural gas, oil and NGLs produced by our customers. As a result, any prohibitions on hydraulic fracturing or increased regulation of the upstream oil and gas industry could affect our Midstream business.

- Increased regulations surrounding pipeline construction and siting, including consideration of GHG emissions downstream of pipeline operations.

Key opportunities under IEA’s demand projections include:

- Our Midstream segment is particularly well positioned to take advantage of increased natural gas and NGL production projected by the IEA in all three of its scenarios. Currently, more than 10% of the natural gas produced in the United States passes through our gas processing facilities.

- The increased petrochemical feedstock demand projected by the IEA is expected to further strengthen demand for NGLs from our de-ethanization and fractionation facilities located
in the Marcellus, Utica and Permian basins. The U.S. Energy Information Administration projects U.S. NGL production will almost double by 2050, supported by an increase in global petrochemical industry demand primarily occurring within the next 10 years. The U.S. Department of Energy also indicates that the market can support the establishment of an ethane storage and distribution hub near the Marcellus and Utica basins.¹²

- The integration of our transportation and storage assets with our refining, gas processing and retail locations enables us to act quickly and cost effectively take advantage of market opportunities, such as being located in areas accessible to existing and planned LNG export facilities.

**Our Midstream Resiliency**

The NPS projects the natural gas sector will experience worldwide investments of $8.4 trillion through 2040. Even in the SDS, the natural gas sector is projected to experience worldwide investments of $6.3 trillion. Our strategic goals align with this investment trend. Since 2015, we have invested over $17 billion in our Midstream segment to acquire and steadily grow our natural gas processing capacity. We expect to bring online an additional capacity over the next several years. As shown on Page 19, this investment trend has already lowered the overall carbon intensity of our company substantially, and we expect this trend to continue. It has also benefited the environment, assuming natural gas is displacing coal for electricity generation.

As shown in the graph below, the volume of natural gas we have processed since 2014 has avoided approximately 165 million tonnes of GHGs when compared with coal use.

The IEA projects the United States will continue to be the largest producer of natural gas through 2040, spawning significant exports of natural gas through pipelines to Canada and Mexico and LNG to other regions of the world.

Our natural gas gathering and processing assets are strategically located within the most prolific natural gas basins in the U.S. — the Marcellus, Utica and Permian. This gives us the ability to continue to build incremental infrastructure to meet production demand. It also provides us the ability to build other infrastructure, such as long-haul pipelines, to deliver feedstock and product from these basins to our refineries and terminals, and third-party export terminals planned on the East Coast and the Gulf Coast.

Given the projected viability of our natural gas processing plants, and our previously discussed refining operations, our logistics assets, including storage and transportation assets, will continue to transport feedstocks and products to and from our production facilities. We also project our nationwide logistics network will continue to allow our company to procure and deliver advantaged feedstocks to our production facilities and transport finished products from our facilities to the most advantageous markets.

**GHG Avoided Since 2014 from Coal Displacement**
(assuming incremental natural gas displaces coal for electricity generation)
COMPANY-OWNED RETAIL (INCLUDING SPEEDWAY AND ARCO®)

IEA Demand Projections

Based on the IEA’s demand projections under the NPS and SDS, the type and volume of fuel sold at retail locations could be impacted. By 2040, the NPS and SDS project an 11% and 44% reduction, respectively, in total liquid and gaseous fuel consumption within the U.S. transportation sector. The largest reductions are projected to occur after 2030 because of increased fuel efficiency and the number of electric vehicles projected to enter the transportation fleet.

Despite the growth in electric vehicle sales predicted under the NPS, the IEA indicates biofuels are still expected to be the most important form of renewable transportation fuel in 2040. As a result, the NPS and SDS project a more than twofold increase in the volume of biofuels used by the U.S. road transport fleet through 2040. These fuels, along with other fuels, such as compressed natural gas, would be sold at retail gas stations under the various scenarios.

Company-Owned Retail — Potential Risks and Opportunities

One of the primary risks to the profitability of our company-owned retail segment is reduced consumer demand for traditional transportation fuels, which could reduce revenue from light-product sales at our company-owned retail locations. We are continually evaluating additional investments at retail locations to accommodate increased demand for biofuels and other fuels. The IEA’s biofuel projections, however, provide an opportunity to broaden the customer base of Speedway and ARCO® brands by increasing our biofuel offerings.

Brand Marketing and Company-Owned Retail Resiliency

The acquisition of Andeavor has extended our footprint from coast to coast, enabling us to build brand loyalty with a much broader customer base. There are now roughly 12,000 locations nationwide featuring the Marathon, Speedway and ARCO® brands, providing a sales outlet for more than 70% of the gasoline we produce at our refineries. We have adopted strategic measures that will support the continued success of our company-owned retail operations, even in a carbon-constrained environment. Systems and resources are in place to make us quick to market and an industry leader in offering different fueling options to the customer, including those consistent with the IEA’s biofuels projections. Some recent examples of these capabilities include:

Ethanol flex fuel: Speedway offers ethanol flex fuel (E85), which contains between 51% and 83% ethanol by volume at many of its locations. Data from the U.S. Department of Energy indicates Speedway is currently operating more than 13% of the nationwide retail locations that offer ethanol flex fuel.

Speedway is one of the largest retailers of flex fuel in the United States.
Biodiesel: We offer diesel fuel with at least 11% biodiesel (referred to as B11) at 121 company-owned retail locations and 20% biodiesel (referred to as B20) at 178 retail locations.

Compressed natural gas: We offer compressed natural gas at select Speedway retail locations where there is consumer demand for the product.

Convenience stores and food services: Speedway is a top performer in the convenience store industry with the highest earnings before interest, taxes, depreciation and amortization (EBITDA) per store, per month among its public peers. We also are a leader in light products volume, merchandise sales and total margin on a per store, per month basis. Speedway’s Speedy Rewards® loyalty program has been highly successful, consistently adding participants since its inception in 2004 to reach an average of approximately 6.2 million active members in 2018.

Speedway’s ability to capture and analyze member-specific transactional data enables us to tailor reward discounts and promotions to specific buying behavior. We believe Speedy Rewards is a central reason customers choose Speedway over competitors. This strategic effort has established a loyal customer base that purchases food, beverages and other grocery and convenience items at Speedway retail locations even when not fueling their vehicles. In 2018, approximately 50% of Speedway’s retail margin came from nonfuel merchandise sales.

A recent study indicates that 56% of Americans purchase meals at least once per month at gas station convenience stores, with younger Americans purchasing food at convenience stores more frequently.13

“Data shows that people choose convenience stores over fast food locations because of the convenience of an all-in-one stop for fuel and food, followed by a preference for the taste of the food at c-stores.”

From the article: Convenience Stores Are Eating Into Fast Food’s Market Share, by Alicia Kelso, Forbes, May 20, 2019.
Energy Strategy and Performance

Marathon Petroleum is committed to reducing the carbon intensity of our operations, and we have a successful track record of doing so. Several key initiatives that have had significant impacts include:

• Increasing the energy efficiency of our operations.
• Reducing flaring emissions.
• Reducing fugitive methane emissions.

The Importance of Energy Efficiency

Energy efficiency needs to be a cornerstone of any climate change strategy to promote sustainable and inclusive economic growth. It is one of the most cost-effective ways to enhance the security of energy supplies, boost competitiveness and reduce the environmental footprint of energy systems.

Energy efficiency also makes economic sense. The most cost-effective and environmentally beneficial unit of energy is the one that is never used. That is why we have a corporate energy-efficiency program to drive improvements within each of our business segments.

Through our program, we have saved nearly $500 million in energy costs over the past 10 years and achieved best-in-class performance recognized by numerous U.S. Environmental Protection Agency (EPA) certifications and endorsements through the ENERGY STAR® and SmartWay® Programs, including the ENERGY STAR Partner of the Year award for 2018 and 2019.

More importantly, energy efficiency is part of our corporate culture. As such, our employees identify new ways to cost effectively reduce energy use. With the integration of the Andeavor assets into our portfolio, we expect to identify significant energy-efficiency opportunities over the coming years, which would further reduce our energy use and lead to additional carbon reductions.
Refining “Focus on Energy” Program

Our refining “Focus on Energy” program was established in 2010. Since that time, we have saved nearly $500 million in energy costs and avoided millions of tonnes of GHGs each year. The program is championed by an “Energy Technologist” who works with dedicated energy coordinators at each plant. This team interacts with refining management, operations and engineering staff to execute the following:

• Identify, establish, track and communicate individual operating parameters that influence energy use. Part of the team’s job is to communicate performance and the economic impact from meeting or not meeting the operating parameters.

• Benchmark energy performance using the HSB Solomon Associates’ Energy Intensity Index (EII®). Using this data, we identify opportunities to become more efficient and develop an “energy road map” for each facility that provides a pathway to achieve the identified efficiencies.

• Ensure energy efficiency is designed into proposed capital and expense projects.

• Identify and implement energy-efficiency improvements, including multiyear programs to enhance insulation, steam system performance and heat integration.

• Communicate with and educate our workforce on the importance of energy efficiency so it remains part of our culture.

One of the important indicators of our program is the Solomon-EII metric, which is also an eligibility criterion for refineries seeking recognition in U.S. EPA’s ENERGY STAR Program. Only those refineries that meet the following criteria qualify:

• An EII score within the top 25% of U.S. refineries of similar size, as certified by HSB Solomon Associates. Please note that the EPA does not consider complexity in determining top-tier performance.

• No significant, ongoing environmental enforcement actions or penalties.

MPC is the industry leader in recognition under the ENERGY STAR Program, having earned 74% of the total recognitions (43 of the 58) given to refineries. In addition, our Canton, Ohio, and Garyville, Louisiana, refineries have earned ENERGY STAR recognition every year of the program’s existence — the only refineries in the nation with this distinction. Based on recent 2018 Solomon data, our Canton, Ohio; Garyville, Louisiana; Robinson, Illinois; and St. Paul Park, Minnesota, refineries will be eligible for ENERGY STAR Certification in 2019.

Given the success of our program, we believe other companies could benefit from implementing a similar initiative within their organizations. Toward this objective, we hosted an “ENERGY STAR Industrial Showcase” in 2018 at our Garyville, Louisiana, refinery, and in 2019 at our Canton, Ohio, refinery. These showcases brought together the U.S. EPA, state environmental regulatory agencies, elected officials (from federal, state and local governments), community representatives and, most importantly, other industrial energy consumers within the area to highlight and share the successes we have achieved through the ENERGY STAR Program.

MPC’s refinery in Catlettsburg, Kentucky.
MPC was the only petroleum company to receive ENERGY STAR Partner of the Year recognition in 2018 and 2019.

In April 2019, the EPA awarded Marathon Petroleum Corporation with the 2019 ENERGY STAR Partner of the Year for Energy Management for the second consecutive year. MPC was the only petroleum company to receive this recognition in 2018 and 2019. To qualify for the award, partners must perform at a superior level of energy management and meet the following criteria:

- Demonstrate best practices across the organization.
- Prove organization-wide energy savings.
- Actively communicate the benefits of ENERGY STAR and promote energy efficiency best practices to other commercial and industrial partners.
- Demonstrate compliance with EPA’s regulations.

In 2019, our Logistics and Storage (L&S) organization, which includes our pipelines, terminal and transportation assets, formalized an energy-efficiency program to drive further improvements throughout the organization. The strategy includes three main focus areas:

- Measure energy use to identify and track operating parameters to reduce energy intensity.
- Ensure energy efficiency is designed into proposed capital and expense projects.
- Communicate and educate our workforce on the importance of energy efficiency so it remains part of our culture.

As part of the program, we baselined energy use at nine of our fuel terminals and entered these facilities into U.S. EPA’s ENERGY STAR Challenge for Industry, which sets a voluntary goal to reduce energy usage for an industrial facility by 10% within five years. As part of the challenge, we will report on the reductions we are achieving and use this information to look for energy savings at other MPC sites. Some of the energy-efficiency measures we implemented in our midstream operations in 2018 and 2019 include:

**Terminal Vapor Recovery Units:** We have installed Vapor Recovery Units (VRUs) at 53 light-product terminals to replace Vapor Combustion Units (VCUs). VCUs burn vapors that result from loading petroleum products into transport trucks, whereas VRUs collect and recycle the vapors, eliminating the emissions that result from combusting the vapors. Our VRUs recovered approximately 16 million gallons of product in 2018, which avoided nearly 140,000 tonnes of GHGs. In recent years, we began installing Continuous Emission Monitoring Systems (CEMS) with smart-start VRU processing equipment at 46 terminals. The VRUs in these systems operate only when a truck is being loaded, which resulted in direct power cost savings of more than $1.2 million in 2018 and lower GHG emissions. In 2020, the remaining terminals with VRUs are slated to receive CEMS.
**Marine Fuel Optimization:** Our Marine organization continues to implement its fuels optimization program in our inland and ocean-going marine fleets. The program has been a huge success, reducing fuel usage up to 2 million gallons per year and avoiding more than 20,000 tonnes per year in GHG emissions. The program requires captains to continuously monitor speed and acceleration, resulting in an average speed reduction of about 2 mph.

This small moderation can reduce fuel usage by as much as 20%. We also partnered with the Port of Long Beach, California, by participating in their “Green Flag Incentive Program.” The voluntary initiative encourages ocean carriers to slow ships to 12 knots or less within 20 or 40 nautical miles of the Port of Long Beach. MPC received a 25% reduction in dockage fees for participating in the program. The port estimates this prevents the emission of over 40,000 tonnes of greenhouse gases and 1,000 tons of general air pollutants each year.

**Transportation Fleet Efficiency:** We are continuing our relationship with the EPA’s SmartWay Transport Partnership, which recognizes the best-performing freight carriers for GHG efficiency. To achieve this milestone, our transport operations use low rolling resistance tires, along with other aerodynamic improvements, such as modified mud flaps. We also install DriveCam® and GEOTAB driver-assist systems on our fleet vehicles, giving us the ability to monitor and moderate driver behavior (such as fast acceleration, hard braking, speed and excessive idling) to increase our fleet’s safety and efficiency. We have also optimized delivery routes. Through these improvements, we have increased the fuel efficiency of our fleet, reducing overall fuel usage and lowering GHG emissions.

**Fired-Heater Improvements:** In 2019, we began implementing a heater optimization program at our gas processing facilities with assistance from our refining heater technologists. By establishing and adhering to energy operating parameters for each large heater, we will reduce the amount of natural gas being burned and consequently GHGs and emissions of oxides of nitrogen.

**Carbon Capture Use and Sequestration:** We continue to invest in assessing technology to capture carbon dioxide that is emitted from our processes for use and/or sequestration. We currently capture approximately 430,000 tonnes of carbon dioxide per year. We have installed carbon dioxide recovery units on the hydrogen plants located at our Los Angeles and Martinez, California refineries; the ethanol fermentation plants in Albion, Michigan and Greenville, Ohio; and the amine regenerator at our Catcher Ranch, Oklahoma gas processing plant. Captured carbon dioxide is currently being sold for industrial applications and to the food and beverage industry.

**Retail Energy Improvements**

In 2019, Speedway created a cross-functional team to evaluate and implement store-level energy savings initiatives. This team will identify future focus areas and opportunities to make our retail outlets more energy efficient. One of the main projects implemented since the acquisition of additional company-owned and -operated stores from Andeavor has been the conversion of these locations to the Speedway brand. As part of the conversion, we are upgrading interior and exterior lighting to high-efficiency LED lighting. We anticipate converting more than 375 stores by the end of 2019. LEDs are more efficient than fluorescent lights and use up to 80% less energy than traditional incandescent lights. We are also upgrading the fuel pricing sign backlighting to high-efficiency LED lighting at approximately 400 Speedway stores.
Reducing Flaring Emissions

Flares are essential safety equipment that combust any excess gases that can otherwise build up in the pipes and vessels of our facilities, so that these gases do not vent directly into the atmosphere when a facility shuts down, loses power or has some other abnormal operating condition. Flaring is, however, something that we try to avoid. To do so, we have established a three-pronged strategy that has significantly reduced our flaring emissions. The strategy includes:

1. **Prevention** — monitor the volume of gases entering the flare system and act if a noticeable increase occurs.

2. **Recovery** — recover gases through flare gas recovery systems.

3. **Effective Combustion** — ensure effective combustion efficiency to destroy hydrocarbon compounds by continuously monitoring flare operating parameters.

We estimate that our flaring improvement strategy has resulted in more than a 90% reduction in emissions of volatile organic compounds and nearly a 60% reduction in GHG emissions from flares compared to emissions prior to implementing the flare improvement program.

We have programs in place to ensure that gases are not leaking into the flare system. For example, after maintenance activities, we complete a walk-down of the process to ensure that all valves are closed to the flare system. In addition, we monitor the flow within the flare header. If we see an increase, we will investigate the cause of the increase and take appropriate action.

In 2018, we completed a multiyear project to install flare-gas recovery systems at our refineries with a total project cost exceeding $500 million. Flare-gas recovery systems recover waste gas that has entered the flare system so it can be put to beneficial use as fuel within the refinery rather than being burned in the flare. Recovering these gases reduces reliance on purchased natural gas, lowering GHG and other pollutant emissions. Since 2014, we have recovered over 41 billion cubic feet of gases that were previously being burned in flares. These gases have a value of close to $30 million per year. As a result, we have avoided approximately 1.7 million tonnes of GHG emissions over that period, with more than 500,000 tonnes avoided in 2018 alone.

For those gases that cannot be recovered, we have established flare operating parameters to ensure we effectively combust the hydrocarbon compounds. These parameters were developed in cooperation with the EPA as part of its refinery flare enforcement initiative. We were the first company to produce and publish the results of our own flare performance tests, setting the standard for the measurement techniques and technologies that the EPA adopted for industrial flares. Subsequently, we entered into an agreement with the EPA to reduce flaring emissions at our refineries.
Reducing Fugitive Methane Emissions in Our Midstream Operations

The IEA notes that “natural gas has many advantages in a world concerned about carbon emissions and air quality. However, methane emissions along the natural gas value chain, if they are not abated, threaten to reduce the climate benefits of using natural gas.” We are implementing measures to reduce fugitive methane emissions across our natural gas gathering and processing operations. These methane emission reductions are a particularly effective way to limit GHGs because methane emissions are up to 25 times more potent than carbon dioxide emissions. The following measures are examples of some of the actions we are taking:

- **Pipeline launchers and receivers:**
  As part of a settlement agreement with the EPA, we redesigned pipeline launcher and receiver stations to minimize emissions of methane and volatile organic compounds (VOCs) each time they are opened as part of required operation. These improvements are estimated to reduce methane emissions as much as 91%, eliminating approximately 1,000 tonnes per year. As part of the settlement, we also agreed to share our proprietary designs for the launcher and receiver stations on our website to promote reductions across the industry.

- **Flaring reductions:** In April 2019, we received an environmental excellence award from the Gas Processors Association for developing a mobile compressor to recover gases vented from a launcher and receiver station that was previously required to be flared. The “zero emission vacuum compressor” (ZEVAC) is able to recover gases that would have been sent to a flare and compress them back into the gathering system. This eliminates hydrocarbon flaring and reduces GHGs, including methane.

- **Leak detection and repair (LDAR):** We have adopted a stringent LDAR program at our gas processing and fractionation plants that is estimated to reduce our methane emissions by another 2,000 tonnes per year. The program has lowered our VOCs leak detection rate from 10,000 ppm, which is the typical industry standard, to 500 ppm. We are also monitoring components such as fin fan plugs and product loading arms that are not required to be monitored under current LDAR regulations. In addition, we have adopted a policy that new valves must be certified as low-leak technology, which means they are tested by the manufacturer to not leak above 100 ppm by volume. We have memorialized these practices in an agreement with the EPA. The agreement includes a requirement to conduct third-party audits to ensure compliance with the practices.

- **High-bleed pneumatic controllers:** We have a program in place to phase out high-bleed pneumatic controllers at our compressor stations. We have completed a phase-out of these types of controllers in our Utica and Marcellus operations, and we are working toward a phase-out in other regions.

Collectively, these innovative practices and design modifications will continue to lower fugitive methane emissions throughout our natural gas gathering and processing system.
Metrics and Performance Data

Each year we measure our performance on a variety of environmental metrics and report them in our annual Sustainability Report. The graphs to the right and the table on Page 42 include select metrics germane to climate-related risks. These metrics are an important tool we use to measure our performance against our goal of continually lowering the greenhouse gas intensity of our operations. We have reduced our GHG intensity by 17% since 2014. This was accomplished through the diversification of our portfolio to include lower carbon intensive operations such as biofuels production and natural gas gathering and processing. We have also continued to lower the carbon intensity of our assets themselves through the energy-efficiency and emission-reduction programs we outlined in the previous section of this report. By focusing on the intensity, we avoid emitting millions of tonnes of greenhouse gases each year.

A lab technician analyzes a sample at our Galveston Bay refinery in Texas City, Texas.

### MPC GHG Intensities

#### Company GHG Intensity
(Scope 1 and Scope 2 Emissions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Intensity (tonnes CO2e/mboe manufacturing input)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>30.3</td>
</tr>
<tr>
<td>2015</td>
<td>28.1</td>
</tr>
<tr>
<td>2016</td>
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</tr>
<tr>
<td>2017</td>
<td>25.8</td>
</tr>
<tr>
<td>2018</td>
<td>25.2</td>
</tr>
</tbody>
</table>

#### Refining GHG Intensity
(Scope 1 and Scope 2 Emissions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Intensity (tonnes CO2e/mboe manufacturing input)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
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<tr>
<td>2015</td>
<td>32.6</td>
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<td>2016</td>
<td>32.5</td>
</tr>
<tr>
<td>2017</td>
<td>31.0</td>
</tr>
<tr>
<td>2018</td>
<td>30.4</td>
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</tbody>
</table>

#### Natural Gas Gathering and Processing GHG Intensity
(Scope 1 and Scope 2 Emissions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Intensity (tonnes CO2e/mboe manufacturing input)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
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<tr>
<td>2015</td>
<td>15.3</td>
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<tr>
<td>2016</td>
<td>14.9</td>
</tr>
<tr>
<td>2017</td>
<td>13.6</td>
</tr>
<tr>
<td>2018</td>
<td>13.4</td>
</tr>
</tbody>
</table>
Managing Physical Risks to Our Facilities

Throughout our more than 130 years of successful operation, we have developed mature systems to effectively manage both the potential for acute physical risks, such as floods, wildfires and hurricanes, and chronic physical risks, such as sea-level rise or water shortages.

We ensure that our facilities are designed, constructed and operated to withstand a variety of extreme weather and environmental conditions. Based on our experience, we continuously assess whether additional measures are necessary. We have spent hundreds of millions of dollars hardening our assets where appropriate. For instance, when we constructed the wharf at our Martinez, California, refinery, we factored a potential sea-level rise into the design of the facility. We have also upgraded control rooms at our refineries in Garyville, Louisiana, and Texas City, Texas, to withstand wind and storm surges characteristic of the most extreme weather in their locations. Some of our locations, like our two largest refineries on the Gulf Coast of the United States, are also protected by extensive levee systems maintained by levee districts regulated by the federal government.

Above: Our Galveston Bay refinery operations control center is built to withstand winds from a Category 5 hurricane.
After construction of a facility or asset, we monitor and manage its integrity and adjust as necessary based on changing conditions. An example is the integrity management of our pipeline system. We proactively monitor stream crossings throughout our pipeline network using a powerful combination of physical inspections and predictive modeling. By doing so, we have identified pipeline segments that we plan to proactively relocate deeper below waterway beds than they currently exist to reduce the risk of future scouring if stream water levels increase.

We also proactively prepare for emergencies to ensure we can respond effectively. We have a dedicated Emergency Management Group (EMG) that assures our ongoing ability to respond rapidly and appropriately to emergency incidents anywhere we operate. The EMG staff coordinates with all business components to implement best practices. Each of our operating locations maintains site-specific emergency preparedness and response plans tailored to the risks they may encounter. These location-specific plans are subject to regular drills and exercises to ensure proper implementation in the event of a real incident.

For incidents with a potential for major disruption beyond the facility level, we have a Corporate Emergency Response Team (CERT). The CERT is comprised of about 250 professionals throughout the company with response expertise and training in the Incident Command System, a globally recognized organizational structure designed to integrate resources across multiple agencies and organizations when an emergency event occurs. To maintain readiness annually, our CERT members participate in at least one very large annual simulation training exercise and multiple other exercises in support of operating components. As in a real incident, CERT drills involve federal organizations, such as the U.S. EPA, the U.S. Coast Guard, state environmental protection or wildlife agencies and local emergency responders.

We go to great lengths to safely maintain our operations throughout severe weather incidents and to quickly recover. We have standing agreements in place for alternate workspaces, necessary office equipment and multiple means to maintain internet and telephone connectivity, even during prolonged power outages. We also have agreements for supplies such as generators, repair materials, water and more. We maintain an emergency mass notification system to communicate with personnel before, during and after an emergency. This information is vital to providing humanitarian aid to our personnel, contractors and local communities.

We also have a Business Recovery Team (BRT) that responds during emergency situations to maintain transportation fuel supplies to affected areas. The BRT coordinates supply and transportation methods throughout our operational areas. The team’s efforts help ensure fuel supplies reach affected areas, facilitating recovery efforts, and enabling daily life and normal operations to resume as quickly as possible.

CERT members communicating during our annual simulation training exercise.
**Water Availability**

The availability of clean fresh water is vital to our operations. Water is used to add heat to the process (as steam), remove heat from the process (as cooling water), remove salts and impurities from crude oil, protect equipment from corrosion, generate hydrogen and clean equipment during maintenance activities. With our recent acquisitions, we have additional operations located in water-stressed areas that are projected to become more stressed by mid-century due to population growth, changing climate and rainfall patterns. We monitor information sources such as the National Climate Assessment, Aqueduct Water Risk Atlas and real-time government drought data to identify which operating locations are in current and future water-stressed areas so we can effectively focus resources accordingly.

Our focus on responsibly managing the use and sourcing of fresh water remains critical to our business, society and the environment. We are focused on water conservation in four primary areas: design; reduction; reuse and recycling; and sourcing. Within our Refining organization, we are developing a “Focus on Water” program similar to our “Focus on Energy” program described on Page 31 that we will pilot in 2020. Some additional examples of each focus area are provided below.

**Reduction:** This past year, our Galveston Bay refinery in Texas City, Texas, focused on accurate water use measurement by ensuring water meter accuracy and proper water flow accounting (material balance). Likewise, the Gallup, New Mexico, and El Paso, Texas, refineries reduced water losses by repairing steam traps, recovering condensate, reducing cooling tower blowdown cycles and other repairs. Additionally, the Martinez, California, and the Catlettsburg, Kentucky, refineries implemented steam trap programs to minimize steam leaks and reduce water usage. To ensure similar best practices are consistently employed across our facilities, an MPC reference document was published to ensure proper steam trace, steam trap, and condensate recovery system design and maintenance.

**Freshwater Withdrawal Intensity**

Where practical, we design operations to avoid reliance on water. For instance, nearly all our gas processing plants are equipped with hot oil heaters that transfer heat to the process and air-cooling units, referred to as fin fans, that circulate hot product through air-cooled radiators. These design features eliminate the need for cooling towers and steam boilers that rely on fresh water. As a result, our gas processing facilities use little to no freshwater in their routine operations.
Reuse and Recycle: Recycling water allows us to further optimize our water usage by reusing a portion of our treated wastewater. Wastewater is currently recycled at our Robinson, Illinois, and Detroit, Michigan refineries. Additionally, our Dickinson, North Dakota, refinery recycles treated municipal wastewater for all its water supply needs, and our Los Angeles refinery recycles treated municipal water for 25% of its water supply needs. We are in the process of implementing a project at our Los Angeles refinery to increase the use of treated municipal wastewater by another 1.5 million gallons per day, which will provide approximately 40% of the refinery’s water needs. Another example of recycling is to utilize closed-loop cooling-water systems rather than using fresh water. While this process is utilized at most of our facilities, the Salt Lake City, Utah, refinery converted two once-through cooling water systems to a closed-loop cooling water system in 2018, saving nearly 200,000 gallons per day of intake water with a comparable effluent water discharge decrease.

Our terminals and pipeline organizations also reuse water for hydrotesting (a form of pressure testing) tanks and pipelines where feasible, rather than treating and discharging water after each use.

Sourcing: Nearly half of our water supply is sourced from external suppliers such as municipalities, public utilities and water authorities. By engaging our suppliers to more fully understand their water conservation and drought contingency efforts, we have diversified our water supply to minimize drought risk to our Texas operations and identified opportunities for continued sustainable water sourcing. For example, our El Paso, Texas, refinery’s external water supply comes in part from a brackish groundwater desalination plant. Likewise, our Texas City, Texas, refinery now has access to additional reservoir water (water collected during heavy rains that can be released to supply the refinery during dry periods). Continuing to work in cooperation with our water suppliers will likely identify additional water conservation and drought resilient sourcing opportunities.
Conclusions

With the projected continuing global demand for oil and gas, we believe MPC is well positioned to remain a successful company even under the IEA’s carbon-constrained Sustainable Development Scenario (SDS). Our Board of Directors, through its Sustainability Committee and executive leadership team, will continue to enhance our climate-related strategies using the framework of the Task Force on Climate-Related Financial Disclosure’s recommendations, including the use of scenario planning. We believe our mature governance and risk management processes enable the company to effectively monitor and adjust to physical risks and the transitional risks associated with a carbon-constrained future. The following strategies highlight areas in which we can continue to effectively mitigate potential climate-related risks and take advantage of the potential climate-related opportunities that may present themselves:

- Continue to measure energy efficiency as a key metric and improve energy efficiency of all our assets. The emissions targets modeled in the NPS and SDS cannot be met without continued efficiency improvements to all energy sectors including electricity generation, buildings, industrial and transportation. Improved energy efficiency also makes economic sense and contributes to our cost competitiveness. As a U.S. EPA ENERGY STAR Partner we are doing our part by sharing our best practices with other energy users and adopting best practices we learn from other ENERGY STAR Partners.
- Continue the steady growth of our midstream assets. Demand for natural gas and NGLs is expected to grow through 2040 under both IEA scenarios, and we are well positioned to take advantage of that growth.
- Continue to promote the production and sales of renewable fuels, including advancing research and development of renewable fuels technology through our wholly-owned subsidiary Virent. With approximately 20% of our refining capacity and marketed transportation fuels subject to the California Cap-and-Trade program (AB 32) and California LCFS program, we intend to continue making investments in energy efficiency at our California refineries along with significant investments in biofuels production to produce lower-carbon transportation fuels.
- Continue to invest in our refineries to become more energy efficient, and increase upgrading capabilities, yield flexibility and conversion capacity so that we maintain flexibility to efficiently produce the refined products most in demand. We expect higher cost, less efficient refineries in other regions would shut down or reduce utilization enabling us to establish new markets for our gasoline and distillate products through increased exports.
- Continue to optimize distillate production at our refineries. Even in the carbon-constrained SDS, the IEA notes alternatives to hydrocarbons are scarce in the freight and aviation sectors.
- Continue to conserve freshwater resources and reduce water consumption in areas where there is a potential for water scarcity to affect our operations.

The prospective costs of climate regulations to our business are considered part of our strategic planning process and our approval of capital project allocations. By ensuring our refineries, midstream assets, marketing systems and retail stores are competitive and efficient, we expect to be in a superior position to meet demand, even in a carbon-constrained future.
### Environmental Performance\(^{(1)}\) \(^{(2)}\)

<table>
<thead>
<tr>
<th>COMPANY MANUFACTURING INPUTS</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedstock charged to processing facilities (million boe)(^{(3)})</td>
<td>1,358</td>
<td>1,522</td>
<td>1,588</td>
<td>1,669</td>
<td>1,717</td>
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<tr>
<td>Refining</td>
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<td>1,055</td>
<td>1,075</td>
<td>1,107</td>
<td>1,111</td>
</tr>
<tr>
<td>Midstream Natural Gas Gathering and Processing</td>
<td>332</td>
<td>466</td>
<td>513</td>
<td>562</td>
<td>605</td>
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### GREENHOUSE GAS EMISSIONS

<table>
<thead>
<tr>
<th>Total Company direct and energy indirect GHG emissions (million tonnes CO(_2)e)</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td><strong>Scope 1 Direct GHG emissions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refining</td>
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<td>36.1</td>
<td>36.9</td>
<td>36.7</td>
<td>36.4</td>
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<tr>
<td>Midstream</td>
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<td>4.9</td>
<td>5.1</td>
<td>5.1</td>
<td>5.3</td>
</tr>
<tr>
<td>Retail and Other</td>
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<td>0.04</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Scope 2 Energy indirect GHG emissions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refining</td>
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<td>7.8</td>
<td>8.3</td>
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<tr>
<td>Retail and Other</td>
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<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
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<tr>
<td><strong>Company direct and energy indirect GHG intensity (tonnes CO(_2)e/thousand boe manufacturing input)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refining</td>
<td>33.8</td>
<td>32.6</td>
<td>32.5</td>
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<tr>
<td>Midstream</td>
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<td>15.3</td>
<td>14.9</td>
<td>13.6</td>
<td>13.4</td>
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</tbody>
</table>

### WATER

<table>
<thead>
<tr>
<th>Freshwater withdrawal (million cubic meters (m(^3))</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal</td>
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<td>142</td>
<td>145</td>
<td>146</td>
<td>148</td>
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<tr>
<td>Groundwater</td>
<td>17</td>
<td>22</td>
<td>22</td>
<td>21</td>
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<tr>
<td>Surface Water</td>
<td>73</td>
<td>78</td>
<td>81</td>
<td>81</td>
<td>82</td>
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<tr>
<td><strong>Freshwater withdrawal intensity (m(^3)/thousand manufacturing boe input)</strong></td>
<td>103</td>
<td>93</td>
<td>91</td>
<td>88</td>
<td>86</td>
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<tr>
<td>Reclaimed water used (million m(^3))</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>7</td>
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<tr>
<td>Wastewater discharged (million m(^3))</td>
<td>78</td>
<td>74</td>
<td>76</td>
<td>75</td>
<td>79</td>
</tr>
<tr>
<td>To publicly owned treatment works (POTW)</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>To injection well</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<td>2</td>
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<tr>
<td>To surface</td>
<td>55</td>
<td>51</td>
<td>53</td>
<td>54</td>
<td>58</td>
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<tr>
<td><strong>Wastewater discharge intensity (m(^3)/thousand manufacturing boe input)</strong></td>
<td>58</td>
<td>49</td>
<td>48</td>
<td>45</td>
<td>46</td>
</tr>
</tbody>
</table>

**Notes**

\(^{(1)}\) Includes data from facilities that MPC may have not yet owned, so that performance can be compared across the same asset base over time. Assets included are those that MPC owned/operated as of Dec. 31, 2018.

\(^{(2)}\) Environmental performance reported for facilities of which MPC has operational control.

\(^{(3)}\) BOE or barrel of oil equivalent is a unit of energy based on the energy released by burning one barrel of crude oil or 5.8 million British thermal units.

\(^{(4)}\) Refining GHG intensity does not include emissions associated with electricity that is produced by our cogeneration facilities sold to third parties.

\(^{(5)}\) Wastewater discharge levels are influenced by variation in annual precipitation levels.
Endnotes

1 Scope 1 emissions cover all direct GHG emissions by a company. It includes fuel combustion, company vehicles and fugitive emissions. Scope 2 emissions cover indirect GHG emissions from consumption of purchased electricity, heat or steam.

2 We retained HSBC Solomon Associates to evaluate the resiliency of our refineries against the projections in the IEA's NPS and SDS, as they were presented in the World Energy Outlook 2018. HSBC Solomon Associates is uniquely qualified to perform this analysis because it has cost and production data for approximately 85% of worldwide refineries through its biennial fuels studies. https://www.solomononline.com/benchmarking/refining/fuels-study. The biennial HSBC Solomon Associates Fuels Studies are a key resource we use to benchmark our operations and conduct scenario analyses.

3 “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. It is important to remember that scenarios are hypothetical constructs; they are not forecasts or predictions, nor are they sensitivity analyses.” The three scenarios — the IEA's CPS, NPS and SDS — are widely used around the world and recommended by the TCFD for scenario analyses. [Sources: Task Force on Climate-Related Financial Disclosures, The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities (June 2017); International Energy Agency, World Energy Outlook 2016 (2016).]


5 There are considerable challenges to reaching the levels of electric vehicles and other renewable technologies predicted by the IEA NPS and SDS. For instance, the SDS models more than 900 million electric cars on the road in 2040, up from just 3 million electric cars on the road today. See IEA, World Energy Outlook 2018 at Pages 90-91 and 326.


7 There are considerable challenges to reaching the levels of electric vehicles and other renewable technologies predicted by the IEA New Policies Scenario and SDS, Particularly, “the technologies assumed to populate the clean energy shift — wind, solar, hydrogen, and electricity systems — are in fact significantly MORE material intensive in their composition than current traditional fossil-fuel-based energy supply systems.” [Source: World Bank, The Growing Role of Minerals and Metals for a Low-Carbon Future (June 2017); see also Dawkins et. al., Stockholm Environmental Institute, Metals in a Low-Carbon Economy: Resource Scarcity, Climate Change and Business in a Finite World (2012)].

8 The IEA did not supply a specific analysis of the refining sector in its SDS, but the IEA notes that overall refining outputs in 2040 are 35% lower than in the NPS.

9 https://www.solomononline.com/benchmarking/refining/fuels-study. The biennial HSBC Solomon Associates Fuels Studies are a key resource we use to benchmark our operations and conduct scenario analyses.

10 We currently capture and sell approximately 200,000 tonnes of CO2 per year from our Los Angeles and Martinez, California, refineries. An additional 58,000 tonnes per year is captured and sold from one of our gas processing plants in Oklahoma.

11 The United States is the largest gas producer today and according to the IEA will remain so throughout the outlook period. In the late 2020s, the United States is expected to produce one-third more gas than the next largest producer (Russia). Remaining resources of shale gas have been revised up to 34 tcm, a 5.5 tcm increase compared with IEA's 2017 projection, in line with new estimates from the U.S. Energy Information Administration.

12 United States Department of Energy, Ethen Storage and Distribution Hub in the United States (November 2018).


Forward-looking statements

This publication includes forward-looking statements. You can identify our forward-looking statements by words such as “anticipate,” “believe,” “design,” “estimate,” “expect,” “forecast,” “goal,” “guidance,” “imply,” “intend,” “objective,” “opportunity,” “outlook,” “plan,” “policy,” “position,” “potential,” “predict,” “priority,” “project,” “projection,” “prospective,” “pursue,” “seek,” “strategy,” “target,” “could,” “may,” “should,” “would,” “will” or other similar expressions that convey the uncertainty of future events or outcomes. Such forward-looking statements are not guarantees of future performance and are subject to risks, uncertainties and other factors, some of which are beyond the company’s control and to which we are subject. The forward-looking statements are made in reliance on the safe harbor provisions of Section 21E of the Securities Exchange Act of 1934 and Section 27A of the Securities Act of 1933. The forward-looking statements are not guarantees of future performance and are subject to a variety of risks, uncertainties and assumptions, including, without limitation, those identified herein affecting MPLX, and the factors set forth under the heading “Risk Factors” in MPC’s Annual Report on Form 10-K for the year ended Dec. 31, 2018, and in its Quarterly Reports on Form 10-Q, filed with Securities and Exchange Commission (SEC). We have based our forward-looking statements on our current expectations, estimates and projections about our industry. We caution that these statements are not guarantees of future performance and you should not rely unduly on them, as they involve risks, uncertainties and assumptions that we cannot predict. In addition, we have based many of these forward-looking statements on assumptions about future events that may prove to be inaccurate. While our management considers these assumptions to be reasonable, they are inherently subject to significant business, economic, competitive, regulatory and other risks, contingencies and uncertainties, many of which are difficult to predict and many of which are beyond our control. Accordingly, our actual results may differ materially from the future performance that we have expressed or forecast in our forward-looking statements. We undertake no obligation to update any forward-looking statements except to the extent required by applicable law. Copes of MPC’s Form 10-K and Forms 10-Q are available on the SEC’s website, MPC’s website at https://www.marathonpetroleum.com/investors/ or by contacting MPC’s Investor Relations office.