Perspectives on Climate-Related Scenarios

RISKS AND OPPORTUNITIES

October 2018
Glossary of Terms

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

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 refineries)

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

CAFE Standard: Corporate Average Fuel Economy standard for vehicle fleets mandated by the U.S. federal government

DOE: The U.S. Department of Energy

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

EIN (a non-GAAP financial measure): Earnings Before Interest, Tax, Depreciation and Amortization

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.

EPA: The U.S. Environmental Protection Agency

ERM: Enterprise Risk Management

G20: An international forum for the governments and central bank governors from 20 of the world’s largest economies

GHGs: Greenhouse gases, such as carbon dioxide and methane

IEA: International Energy Agency

LNG: Liquefied natural gas

Metric ton: 2,205 pounds

MPC: Marathon Petroleum Corporation

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

OECD: Organisation for Economic Co-operation and Development – a group of the world’s most industrialized nations

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,

Millions of people rely on us for the fuels and other products that make their lives better every day, and our shareholders rely on us to be good stewards of their investment. To meet these expectations, MPC’s Board of Directors and executive leadership team anticipate and prepare for a variety of risks to our business.

Among the risks we consider are those modeled in the hypothetical climate-related scenarios outlined by the International Energy Agency (IEA) and the possibility of extreme weather events. In this publication, we summarize how we have invested in our ability to succeed long into the future, under a variety of scenarios.

We have invested billions of dollars to make our operations more energy efficient, reduce our emissions, diversify our business, and harden our facilities against extreme weather like hurricane-force winds and floods.

As with any investment we make, we look for measurable results. For example, our energy-efficiency program has saved us hundreds of millions of dollars over the last decade. MPC has also earned more ENERGY STAR® awards from the Environmental Protection Agency than all other U.S. refiners combined, and this year we earned an ENERGY STAR Partner of the Year award for our efforts to increase energy efficiency throughout our business.

We have focused on diversifying our business to include natural gas gathering and processing, biofuels manufacturing and expanded retail offerings. We have added significant geographic diversity through our strategic combination with Andeavor, which closed on Oct. 1, 2018. We expect to achieve significant synergies, which will enable us to provide our products and services more cost-effectively.

Marathon Petroleum Corporation has been successfully managing risk since its founding more than 130 years ago. We believe the steps we have taken to enhance our resilience leave us well-positioned to succeed in an ever-changing world. We thank you for your ownership stake in MPC.

Sincerely,

Gary R. Heminger
Chairman and Chief Executive Officer
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 partners of MPLX LP and Andeavor Logistics LP (ANDX), two strong, customer-focused midstream master limited partnerships. MPC’s nationwide retail and marketing business includes company-owned and -operated stores and branded locations.

**OPERATING SEGMENTS**

**Refining and Marketing:** MPC refines crude oil and other feedstocks at its 16 refineries located in 13 states. MPC sells refined products to wholesale marketing customers domestically and internationally, buyers on the spot market, our retail business and to independent entrepreneurs who operate approximately 7,800 branded locations, of which approximately 5,600 are Marathon retail outlets.

**Midstream:** The Midstream segment gathers, processes and transports natural gas; gathers, transports, fractionates, stores and markets NGLs; and transports and stores crude oil and refined products via pipelines, terminals, towboats and barges. MPC has ownership in MPLX and ANDX, two master limited partnerships that are well-positioned for growth in key regions of the U.S.

**Company-Owned Retail:** The retail business includes the nation’s second-largest company-owned and -operated convenience store chain, selling transportation fuels and convenience products to retail markets. We have approximately 3,900 locations across the United States, which include company-owned and -operated Speedway retail convenience stores and multi-site operated (MSO) locations.

**CORPORATE VALUES**

We strive to always act responsibly with those who work for us, with those business partners who work with us and in every community where we operate. Several core values guide our approach to doing business, including: Health and Safety, Environmental Stewardship, Integrity, Corporate Citizenship, and Diversity and Inclusion.
INTRODUCTION

In December 2015, the Financial Stability Board – a global body focused on promoting global financial stability – launched the Task Force on Climate-related Financial Disclosures (TCFD) to develop a set of recommendations for “consistent, comparable, reliable, clear and efficient climate-related disclosures by companies.” The TCFD issued its final recommendations in June 2017, garnering endorsement by a majority of the G20 countries and more than 100 large businesses. We issued our first Perspectives on Climate-Related Scenarios publication just four months later.

As we continue to enhance our reporting on climate-related risks and opportunities, we have incorporated more of the TCFD’s recommendations in this year’s Perspectives publication.

We report on governance, risk management, strategy and metrics related to the subject of climate change, as well as results of a stress test of our business against a “2 degree scenario” using the International Energy Agency’s New Policies Scenario and Sustainable Development Scenario (SDS).

These scenarios conclude that petroleum and natural gas will continue to play significant, long-term roles in meeting the world’s energy needs. Based on our analyses, our company is well-positioned to remain successful, even under the carbon-constrained future modeled in the IEA’s Sustainable Development Scenario. We accomplish this through our dedication to efficient, diversified, resilient operations.

In this year’s report, we have enhanced our discussion of governance. We have also added information about our energy efficiency efforts and accomplishments, as well as our water use and wastewater discharge.

We believe our investors, and other interested stakeholders, will find that the extensive disclosures we make in this report, our Annual Report on Form 10-K, our annual Citizenship Report and on our website are aligned with the principles outlined in the recommendations of the TCFD and demonstrate MPC’s resilience to climate-related risks.
Corporate Governance

BOARD OF DIRECTORS

Responsibility for risk management rests with MPC’s Board of Directors and the committees of the Board. MPC’s Board and executive leadership team meet frequently to discuss enterprise risk management (ERM), including the management of climate-related risks. Our business strategy includes the assessment of the company’s business in light of climate-related risks and opportunities. This is a key focus area for our Board.

MPC’s Board members have significant expertise and experience in the energy sector, finance, economics, operations and public policy. Key risks associated with the strategic plan of the company, including emerging risks, are reviewed annually at a designated strategy meeting of the Board and on an ongoing basis throughout the year. The Board receives regular updates from its committees regarding their activities relative to risk oversight and reviews risks of a more strategic nature at the full Board level.

The Board understands that the topic of climate change is an evolving and important area of interest to many of our investors and external stakeholders. The Board recognizes the potential transitional risks, as well as opportunities facing our industry if policies shift toward a lower-carbon economy. Our Board members also recognize there may be potential physical risks related to the climate, and the need for a plan to mitigate those risks. Over the past several years, members of our Board and executive leadership team have met with many shareholders regarding a variety of topics, including how MPC is assessing climate-related risks and opportunities.

All three of the Board’s principal committees assist the Board with oversight responsibilities. Each such committee is comprised entirely of independent, non-employee directors. In late 2018, effective with the close of the Andeavor transaction, the Board established an additional committee. The Sustainability Committee will oversee environment, health, safety and security policies, our annual Citizenship Report and this report. More information, including the committee charters, is available at http://ir.marathonpetroleum.com by selecting “Corporate Governance” and clicking on “Board Committees & Charters.”
EXECUTIVE LEADERSHIP

MPC’s executive leadership team is charged with managing risk under the oversight of the Board and its committees. The company has a strong ERM process for identifying, assessing and managing risk, as well as monitoring the performance of risk mitigation strategies. The governance of this process is managed through the executive sponsorship of our chairman and CEO and our senior vice president and CFO. Our ERM process is led by an enterprise risk manager and supported by officers and senior managers responsible for working across the business to manage enterprise-level risks and identify emerging risks. As part of the ERM process, we conduct an annual risk review with executive management and the Board of Directors. Risks that could materially impact our company are discussed in the Risk Factors section of our Annual Report on Form 10-K filed with the Securities and Exchange Commission.

In 2018, we enhanced our ERM process by establishing two internal non-executive committees dedicated to assessing climate-related issues. The Climate Policy Steering Committee focuses on identifying and analyzing policy-related issues such as greenhouse gas (GHG) regulations, consumer mandates, biofuel mandates, methane regulations, cap and trade systems, carbon taxes, and general stakeholder concerns that could affect our business. The Emerging Technology Steering Committee focuses on technical issues surrounding emerging technologies such as automobile engine efficiency, renewable energy and electric vehicles to understand if or when a potential significant market penetration could occur. Both committees provide valuable information on climate-related risks as part of the ERM process and periodically report out through the executive committees described below.

There are various executive leadership committees that oversee differing aspects of company policy and strategy. Two principal committees are described below:

**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 remain 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.
Risk Management

MPC has a mature enterprise risk management (ERM) process that provides the structure and corporate oversight to ensure that major risks to our business are identified and proactively managed. The following sections provide additional details into how we are addressing potential transitional and physical 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 Climate Policy and Emerging Technology Committees, along with market data and projections from the International Energy Agency and U.S. Energy Information Administration, to develop 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 thresholds for business segments with the greatest financial and regulatory uncertainty. While we do not use a specific carbon price, business segments that would be most affected by high carbon pricing, like our refineries, have higher internal return on investment thresholds than assets that would be less affected by carbon pricing, like our natural gas gathering and processing operations. In addition to capital allocation, the risk areas described on the following pages are also considerations in business planning.
RISK MANAGEMENT

CLIMATE-RELATED POLICIES AND TRANSITIONAL RISKS

MPC recognizes the continued use of fossil fuels will help meet the world’s growing energy needs. Policies must ensure our nation’s – and the world’s – long-term needs for environmental stewardship, energy security and economic development are met.

Scenarios from recognized international bodies, such as the International Energy Agency (IEA), continue to indicate that oil and natural gas will be the dominant sources of energy well into the future. The climate-related policies being considered in the various carbon-constrained scenarios are not suggesting elimination of the oil and gas industry. Instead, these scenarios model a market in which inefficient, high-cost producers and assets would be phased out, allowing the low-cost, more efficient producers and assets to thrive – leading to an overall reduction in GHG emissions. As we describe later in this report, based on a review of our company portfolio against the various climate scenarios, we expect MPC will continue to be successful well into the future.

With this in mind, we continually monitor and assess environmental and climate-related legislation, polices and regulations, as well as participate in the legislative and rulemaking process. We participate to ensure effective planning, and that regulations are transparent and based on sound technical and economic principles. For more information on our political engagement activities, please see our website at http://www.marathonpetroleum.com by selecting “Corporate Citizenship” and clicking on “Political Engagement and Disclosure.”

As we described on Page 6, to ensure we remain engaged in the policy and regulatory challenges related to climate change, we have established two internal committees dedicated to assessing climate-related issues. The Climate Policy Steering Committee focuses on identifying and analyzing policy-related issues such as GHG regulations, biofuel mandates, methane regulations, cap and trade systems, carbon taxes, and general stakeholder concerns that could affect our business. The Emerging Technology Steering Committee focuses on technical issues surrounding emerging technologies such as automobile engine efficiency, renewable energy and electric vehicles to understand if or when a potential significant market penetration could occur, and what the impact would be to our business. Both committees provide valuable information on climate-related risks to the executive committees described on Page 6 for consideration in the ERM process, and short- and long-term business planning.

1 Under the IEA, Sustainable Development Scenario (SDS) – its most carbon-constrained scenario – the IEA projects the oil and gas share of the total primary energy mix will fall from its current 54 percent share in 2016 to 48 percent in 2040, but will continue to be the dominant sources of energy.
THE CLIMATE-RELATED SCENARIOS

In last year’s report, we applied three hypothetical scenarios developed by the International Energy Agency to analyze the effects on our business of various climate-related policies over the long term. The three scenarios – the IEA’s Current Policies Scenario, New Policies Scenario and 450 Scenario – are widely used around the world and are recommended by the TCFD.2

In this year’s report, we are providing an update based on the IEA’s World Energy Outlook 2017 along with a discussion of the IEA’s newest scenario – the Sustainable Development Scenario:

- 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) – 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) – a hypothetical 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 below 2 degrees Celsius.

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.

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**IEA’s Projections for Oil and Natural Gas:** The IEA’s New Policies Scenario projects oil and natural gas will meet approximately 52 percent of global energy demand in 2040, while the SDS shows a slight decrease, at 48 percent of global demand. Even under the SDS, oil and natural gas are still, by far, the dominant sources of energy. By comparison, wind and solar energy in 2040 are expected to provide around 6 percent of energy demand in the New Policies Scenario and 14 percent in the SDS, up from less than 2 percent today.

The IEA’s projections for the transportation sector in 2040 also indicate that oil-based fuels will continue to be the dominant source of energy for transportation worldwide. The IEA projects that in 2040, oil will provide 83 percent of total transportation-related energy demand under the New Policies Scenario and 62 percent under the SDS. Electricity, on the other hand, is projected to have the largest percentage gain, but would still only reach 11 percent of the transportation sector’s energy under the SDS – up from 1 percent today. Transportation in North America has a similar outlook. The IEA forecasts that in 2040, oil will provide 79 percent of the energy needed for transportation in North America under the New Policies Scenario and 54 percent under the SDS. Both biofuels and electricity are projected to have larger market penetration in North America at 22 percent and 13 percent respectively; however, oil-based fuels remain the dominant sources.

Overall, demand for petroleum-based liquids increases through 2040 in the New Policies Scenario. The SDS also projects an increase in demand for petroleum-based liquids through 2025, followed by a decline through 2040. The SDS assumes fuel economy standards, rather than electric vehicles or fuel switching, will be the primary factor that leads oil demand for transportation to peak in the mid-2020s. This also means that higher-efficiency internal combustion engines are expected to continue to be deployed and operable for many years to come.

The other notable outlook from the IEA is an increase in natural gas demand under all three scenarios. Natural gas demand continues to increase in the power sector, as a move away from coal to a less carbon-intensive fuel creates more room for gas to grow. The U.S. continues to be the leading producer of natural gas over the outlook period, and by the mid-2020s is expected to be the world’s largest exporter of liquified natural gas (LNG) as well.
SUMMARY OF CLIMATE-RELATED RISKS AND OPPORTUNITIES

In performing the scenario analyses, we also identified relevant climate-related risks and opportunities.

**Potential Risks:**

- Starting as early as 2020, the demand for traditional transportation fuels could decrease in many Organisation for Economic Co-operation and Development (OECD) countries, including the U.S., due to higher corporate average fuel economy (CAFE) standards, increased market share of electric vehicles and biofuels consumption in the transportation fleet.

- GHG regulations could be implemented, such as methods to further reduce methane emissions from our midstream assets, a carbon tax or similar effort that increases the costs of our products, thereby reducing demand.

- We could face increased litigation with respect to our operations or products in connection with climate-related policy.

- Physical risks, such as intense weather patterns or sea level rise, have the potential to impact our facilities.

- 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 producer customers, as well as, purchase crude oil as feedstock 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 surrounding pipeline construction and siting, including consideration of GHG emissions downstream of pipeline operations.

**Potential Opportunities:**

- Worldwide and domestic demand for natural gas and NGLs is expected to increase through 2040, even in the carbon-constrained SDS. This higher demand is driven by increased use in the power, industrial and transportation sectors.

- Worldwide demand for petrochemical feedstocks is expected to increase through 2040. The IEA notes there are few substitutes for oil-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, putting our assets in a better competitive position.

- Through 2040, gasoline and diesel demand is expected to increase in many countries that are not members of the OECD. 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 carbon-constrained SDS.

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3 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)].
RESULTS OF THE CLIMATE-RELATED SCENARIO ANALYSES

The results of the analyses of these climate-related risks and opportunities to MPC’s three main business segments are as follows:

**Refining and Marketing:** The IEA revised its projections to be slightly more favorable to the North American refining sector in its 2017 rendition of its New Policies Scenario:4

**Worldwide Refining**

- Net refining capacity is expected to increase by another 13.7 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.

- Demand for refined products is expected to be approximately 91.6 million bpd, or 82 percent of projected capacity in 2040. Considering required downtime, the IEA projects refining capacity could exceed demand by 14 million bpd in 2040. Europe has the highest percentage of capacity at risk (31 percent), followed by Japan and Korea (23 percent), China (13 percent) and North America (13 percent), according to the IEA’s projections.

- Under the New Policies Scenario, demand for gasoline and heavy fuel oils is expected to decrease, whereas the demand for other refined products such as petrochemical feedstocks and distillates is expected to increase, because alternatives are scarce for the aviation, freight, maritime and petrochemical sectors. This indicates an overall increase in refined product demand.

- Under the SDS, the IEA models reduced demand for all transportation fuels, assuming regulations and technology will increase the efficiency of the transport, maritime and aviation sectors.

4 The IEA did not supply a specific analysis of the refining sector in its SDS, but the IEA’s transportation fuel demand projections indicate more refining capacity would be at risk in both North America and worldwide than in the New Policies Scenario.
**Refining and Marketing – Potential Risks and Opportunities**

The primary risk to our Refining and Marketing segment is decreased consumer demand for traditional transportation fuels in many OECD countries, including the U.S., due to higher vehicle efficiency standards, increased market share of electric vehicles, replacement with biofuels or increased costs because of regulation. The IEA’s New Policies Scenario and SDS incorporate these risks into the related projections for these scenarios. As we demonstrate in the following discussion, our Refining and Marketing segment is expected to remain successful even with the projections under these scenarios. The primary opportunity is increased demand for gasoline and diesel in many non-OECD countries in Latin America, Africa and Asia. Our assets are favorably located for export to these countries to fulfill their needs.

**Resiliency of U.S. Refining**

Operating costs are a critical component in the financial viability of a petroleum refinery. Refining operating costs depend on a number of factors, including energy costs, refinery size and complexity, utilization rates and labor rates. Energy costs represent a sizeable portion of the overall operating costs of a petroleum refinery.

The U.S. refining sector benefits from lower natural gas costs compared to its global competitors. Lower energy costs translate into lower overall production costs of transportation fuels as reflected in the graph to the right. These favorable energy cost differentials are greater than the regional transportation costs, which enables the U.S. refining sector to export transportation fuels to other countries and regions, including Asia, Mexico, Central America, South America, Africa and Europe.

As shown to the right, this trade flow advantage is confirmed by recent data of U.S. transportation fuel exports. Export volumes have steadily increased in recent years, with much of these exports originating at refineries located in the Gulf Coast region of the U.S. due to their proximity to the Gulf of Mexico and world-class export docks.
Consistent with many other forecasts, the IEA projects the U.S. will continue to maintain lower natural gas prices through 2040 compared to other global regions, even in the carbon-constrained SDS. As a result, the U.S. refining sector should continue to maintain the flexibility and cost advantages to export transportation fuels to various global markets, including those non-OECD countries forecast by the IEA to have transportation fuel demand growth even in the carbon-constrained SDS.

The IEA also notes that the high level of complexity of U.S. refineries provides them a greater capability to adjust output to the products most in demand. 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, which provides a synergy of easy delivery of petrochemical feedstocks and reduces transportation costs and emissions. See example on Page 25, “Recovering Off-Gases for Petrochemical Feedstocks.”

**Resiliency of MPC Refining**

For our 2017 report, we retained HSB Solomon Associates to evaluate the resiliency of our refineries against the projections in the IEA’s New Policies Scenario and 450 Scenario as they were presented in the World Energy Outlook 2016. HSB Solomon Associates is uniquely qualified to perform this analysis because it has cost and production data for nearly 85 percent of worldwide refineries through its biennial Fuels Studies. The key assumptions and factors considered in its analysis were as follows:

- Refineries with high costs to produce transportation fuels 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 were considered.
- Refinery-specific production costs and other data were utilized from HSB Solomon Associates’ latest worldwide Fuels Study in 2016.
- The transportation fuel demands projected in the New Policies Scenario and IEA 450 Scenario from the World Energy Outlook 2016 were used.

THE IEA NOTES THAT U.S. REFINERS BENEFIT FROM A HIGH LEVEL OF COMPLEXITY, HAVE AN AMPLE SUPPLY OF DOMESTIC OIL, LOWER NATURAL GAS COSTS AND ARE FAVORABLY SITUATED SUCH THAT THEY CAN READILY EXPORT TO REGIONS WITH INCREASED DEMAND FOR TRANSPORTATION FUELS AND OTHER REFINED PRODUCTS WHERE DEMAND IS GROWING (LATIN AMERICA, AFRICA AND ASIA).

IEA, WORLD ENERGY OUTLOOK 2017.

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5 https://www.solomononline.com/benchmarking/refining/fuels-study. The biennial HSB Solomon Associates Fuels Studies are a key resource we use to benchmark our operations and conduct scenario analyses.
HSB Solomon Associates concluded that all of MPC’s existing refineries would be cost-competitive, even in the carbon-constrained 450 Scenario. Because there were no material differences between the 450 Scenario presented by the IEA in 2016 and the SDS presented by the IEA in 2017 that would alter the conclusions reached by HSB Solomon Associates, their conclusions are valid for the SDS. This is due to the U.S. cost advantages discussed in the previous section, as well as our cost competitiveness relative to other U.S. refiners. We will provide a more in-depth analysis of the refineries we acquired through our strategic combination with Andeavor in next year’s edition of this report.

Key examples of our commitment to implement strategies that align with the IEA’s product demand projections include:

- We are continuing to execute a strategic plan to expand our capabilities to export from our U.S. Gulf Coast refineries by the end of 2020. This provides us with added flexibility to market more of our gasoline and distillate in other regions like Mexico, Asia, Central and South America, Europe and Africa, including the non-OECD countries that have forecast increased transportation fuel demand through 2040, even in the IEA’s carbon-constrained SDS. The addition of West Coast and border state refineries through the Andeavor combination only strengthens our ability to export to these markets.

- We are further optimizing finished distillate and jet fuel production at our U.S. Gulf Coast refineries over the next five years. This is expected to significantly increase finished distillate production companywide, without a material increase in crude oil throughput.

- Our 16 refineries’ weighted Nelson Complexity Index score is higher than the world average, and by operating them as an integrated system, we are able to further optimize this complexity, targeting output where it is most cost-effective.

- Beginning in 2020, the International Maritime Organization (IMO) will require the sulfur content of bunker fuel to be reduced from 3.5 percent to 0.5 percent. As a result, demand for low-sulfur diesel increases and an oversupply of heavy fuel oil is expected. Our refineries are well-positioned to meet this demand and benefit from the oversupply of heavy fuel oil that can no longer be used for bunker fuel. We are progressing projects at our Garyville and Galveston Bay refineries to increase heavy fuel oil conversion capabilities to take advantage of the low-cost feedstock expected to result from the IMO regulation.

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 carbon-constrained SDS.
In making its projections about biofuels production and consumption, the IEA noted that while advanced biofuels “promise to provide a sustainable pathway to raising total biofuels production, [they] have to overcome major challenges to become available on the scale required by the [Sustainable Development Scenario].”

The New Policies Scenario and SDS project biofuel demand will increase by 2.5 million and 6.4 million bpd on an energy equivalent basis to gasoline and diesel, respectively, from 2016 to 2040. To meet the SDS projections would require an increase in biofuels production of 376 percent.

The majority of this production increase is expected to come from advanced biofuel (i.e., cellulosic, lignocellulosic), which is not projected to occur until after 2025 with anticipated advancements in technology that would allow for production of advanced biofuels at scale.

The SDS forecasts that biofuels will make up approximately 15 percent of total transportation fuels by 2040, including market penetration into the aviation and maritime sectors. Oil-based fuels would continue to supply over 60 percent of transportation fuels.

MPC has made significant investments in the production and blending of renewable fuels as part of our overall business strategy:

- We hold equity ownership in three corn ethanol plants with a total production capacity of 415 million gallons per year.
- We own and operate a facility in Cincinnati, Ohio, that produces biodiesel from soybean oil and methanol. We recently completed a project that increased capacity of the plant to approximately 80 million gallons per year.
- We sell a significant amount of biofuels throughout our company-owned retail network (see next section for details), as well as on the wholesale market and through Marathon brand locations.
- We support advanced biofuels research through our equity ownership in Enchi Corporation, which is developing proprietary technology related to bioprocessing of corn fiber to produce cellulosic ethanol.
- As part of the strategic combination with Andeavor, MPC is considering a project to convert the Dickinson, North Dakota, refinery to a renewable diesel plant that will process up to 12,000 bpd of renewable feedstocks, including soybean oil and distillers corn oil.

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6 International Energy Agency, World Energy Outlook 2016. In its World Energy Outlook 2017, the IEA notes that “advanced biofuel ... [have] fewer environmental and social concerns but higher technical and cost challenges.”

7 The IEA cautions that although biofuels show some promise for aviation fuels, they have not been demonstrated at scale. As a result, if the targets are not achieved, conventional aviation fuel would displace the biofuels projections.
Company-Owned Retail (including Speedway)

IEA Demand Projections

Based on the IEA’s demand projections under the New Policies Scenario and SDS, the type and volume of fuel sold at Speedway retail locations could be impacted.

By 2040, the New Policies Scenario and SDS project a 20 percent and 44 percent reduction, respectively, in total liquid and gaseous fuel consumption within the U.S. transportation sector, with the largest reductions occurring after 2030. The projected decrease in demand is driven by fuel efficiency standards and the number of electric vehicles predicted to enter the transportation fleet.

The IEA notes that despite the growth in electric vehicles in the New Policies Scenario, biofuels are still by far the most important form of renewable energy in 2040. As a result, the New Policies Scenario and SDS project a more than twofold increase in the volume of biofuels used by the U.S. road transport fleet from 2016 to 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 is reduced consumer demand for traditional transportation fuels, which could reduce revenue from light-product sales at our retail locations. Further, we may need to make 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 our Speedway brand customer base by increasing our offerings of biofuels.
**Company-Owned Retail Resiliency**

We have adopted strategic measures that will support the continued success of our retail operations in a carbon-constrained environment. Systems and resources are in place to be quick-to-market and an industry leader in offering different fueling options to the customer, including those consistent with the IEA’s biofuel projections. Some recent examples that demonstrate these capabilities include:

- **Ethanol flex fuel**: Fuels that contain high percentages of ethanol are currently sold at 379 Speedway retail locations, or over 13 percent of our portfolio. Data from the U.S. Department of Energy (DOE) indicates Speedway is currently operating over 11 percent of the U.S. retail locations that offer ethanol flex fuel.

- **Biodiesel**: We offer diesel fuel with at least 11 percent biodiesel (referred to as B11) at 119 Speedway retail locations, and 20 percent biodiesel (referred to as B20) at select travel plaza centers through a joint venture.

- **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 EBITDA per store per month of its public peers. We also have leading positions with respect to other comparisons based on light products volume, merchandise sales and total margin on a per store per month basis. We are continuing to implement a multiyear strategic plan to increase in-store merchandise sales to boost overall gross margin. We are progressing toward this goal by offering an increasing variety of fresh and prepared food, and other grocery items at our Speedway retail locations, including our own Speedway private label products. Through our ever-expanding Speedy Rewards® loyalty program, which averaged approximately 6 million active members in 2017, we are able to capture and analyze member-specific transactional data that enables us to offer Speedy Rewards members discounts and promotions specific to their buying behavior. We believe Speedy Rewards is a key reason customers choose Speedway over competitors, and it continues to drive significant value for both Speedway and our Speedy Rewards members. 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.
**Midstream**

**IEA Midstream Projections**

The IEA’s projections for natural gas, NGLs and other feedstocks are as follows:

- **Natural Gas:** From 2016 through 2040, the New Policies Scenario and SDS project an increase in worldwide natural gas production of 46 percent and 16 percent, respectively. Increased production is primarily driven by higher demand in the power, industrial and transportation sectors. The New Policies Scenario also projects U.S. natural gas production will increase by 39 percent from 2016 to 2040. A majority of this increase is expected to result from increased shale gas and tight oil production.\(^8\)

- **Fractionated Products:** Fractionated products from natural gas processing are expected to increase significantly from 2016 to 2040 under both the New Policies Scenario and SDS. For instance, additional ethane is needed for ethane crackers coming online to produce ethylene, an important petrochemical feedstock. In addition, natural gas liquids (NGLs) are more cost-effective and energy-efficient to process at refineries than heavier crude grades. Lastly, a key goal of the SDS is the availability of clean cooking fuels worldwide over traditional biomass that would be met through greater use of liquified petroleum gas (LPG) – primarily butane and propane. 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 U.S.

- **Petrochemical Feedstocks:** As shown to the right, worldwide demand for petrochemical feedstock is projected to increase by 42 percent from 2016 to 2040 under the IEA’s New Policies Scenario and SDS. The IEA projected the same demand volumes under both scenarios because there are few viable non-hydrocarbon substitutes in the petrochemical industry. In the short to medium term, the U.S. petrochemical industry is projected to experience over 25 percent of the worldwide demand growth in petrochemical feedstocks due to the availability of low-cost natural gas and NGLs.

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\(^8\) The IEA noted additional demand for natural gas and renewable energy could occur by 2040 in the event carbon capture and sequestration (CCS) is not commercialized on a large-scale basis. The SDS currently assumes CCS will be installed on power plants that collectively produce 10 percent, or approximately 400 gigawatts, of the world’s electricity demand.
**Midstream - Potential Risks and Opportunities**

The primary risks facing our Midstream segment, which includes MPLX, are as follows:

- 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 producer 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 in which we are positioned to take advantage of the IEA’s demand projections include:

- Our Midstream segment is particularly well-positioned to take advantage of increased natural gas and NGL production that is projected by the IEA in all three of its scenarios. Currently, approximately 10 percent of the natural gas produced in the U.S. passes through our gas processing facilities.

- The increased petrochemical feedstock demand projected by the IEA will further strengthen increased demand for NGLs from our gas processing facilities. For example, a recent IHS Markit study indicates that there is enough ethane available in the Marcellus and Utica shale plays to support five ethane steam crackers.9 Currently, none are operating in the region with one under construction.

- By having our transportation and storage assets integrated with our refining, gas processing and retail locations, we are able to act quickly and cost effectively to take advantage of market opportunities, such as being located in areas accessible to existing and planned liquefied natural gas (LNG) export facilities.

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**Our Midstream Resiliency**

The New Policies Scenario projects the natural gas sector will experience worldwide investments of $8.6 trillion from 2016 to 2040. Even in the carbon-constrained SDS, the natural gas sector is projected to experience worldwide investments of $6.5 trillion through 2040.

One of our strategic goals is to grow our midstream infrastructure over the long term. This growth will further strengthen MPLX’s position as the largest processor and fractionator in the prolific Marcellus and Utica shale plays, two of the primary areas in which the IEA has projected the growth in U.S. natural gas production. If the Marcellus region were a nation, it would be the fourth-largest natural gas producer worldwide. Based on current utilization, MPLX can support the production of an additional ~80,000 bpd of purity ethane with existing assets to support the ethane crackers being constructed in the Marcellus region. In addition, increased U.S. natural gas production can be marketed globally due to the significant number of existing and planned LNG export facilities in the U.S. In fact, the IEA projects that the U.S., a net importer of natural gas in 2014, will be a net exporter of natural gas in 2020.

We are also continuing to expand operations in the Permian Basin in West Texas and New Mexico through the construction of additional natural gas gathering and processing operations and crude pipeline capacity. These investments will complement existing ANDX assets, giving us a strong foothold in this important shale play.

Given the projected viability of our refining operations discussed in an earlier section, our logistics assets – including storage and transportation assets – would continue to transport feedstocks and products to and from our refineries. Further, as NGL production from our gas plants and fractionation facilities continues, our logistics assets would be used to store and transport these products to market.
THE IMPORTANCE OF ENERGY EFFICIENCY

The IEA projects that energy efficiency will account for 44 percent of the emission reductions needed to meet the goals of the Sustainable Development Scenario. In other words, energy efficiency is the most important factor in reducing greenhouse gas and other emissions under the scenario.

That is why MPC considers energy efficiency to be a key metric and climate-related opportunity with both environmental and financial benefits. We identify where energy can be conserved cost-effectively to reduce our operating costs, save our shareholders money and reduce our environmental footprint.

We have established multiple programs to improve energy efficiency across our assets, including the measurement of energy efficiency using the HSB Solomon Associates Energy Intensity Index (EI®) and the real-time monitoring of our transport trucks’ and marine fleet’s traveling speeds to minimize fuel combustion and ensure the safety of our employees. These energy-efficiency programs and associated metrics have achieved best-in-class performance with 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.

“ENERGY EFFICIENCY NEEDS TO BE AT THE HEART OF ANY STRATEGY TO GUARANTEE SECURE, SUSTAINABLE AND INCLUSIVE ECONOMIC GROWTH. IT IS ONE OF THE MOST COST-EFFECTIVE WAYS TO ENHANCE SECURITY OF ENERGY SUPPLY, TO BOOST BUSINESSES’ COMPETITIVENESS AND TO REDUCE THE ENVIRONMENTAL BURDEN OF THE ENERGY SYSTEM. . . . IT IS POSSIBLE TO SAY WITH CONFIDENCE THAT A SUSTAINED DECOUPLING OF CO2 EMISSIONS FROM ECONOMIC GROWTH WILL NOT HAPPEN WITHOUT MAJOR GAINS IN ENERGY EFFICIENCY.”

INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2016
ENERGY STAR PARTNER OF THE YEAR 2018

In April 2018, the EPA awarded Marathon Petroleum Corporation with the 2018 ENERGY STAR Partner of the Year for Energy Management. This is the highest level of EPA recognition under the program, and MPC was the only petroleum company named in 2018. 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
- Participate actively and communicate the benefits of ENERGY STAR
- Demonstrate compliance with EPA’s regulations

Below you will find more detailed information on the energy-efficiency activities within each of our operating components that contributed to our ENERGY STAR Partner of the Year award.

REFINING

**Focus on Energy Program:** Our Refining business is our most energy intensive component and the source of two-thirds of our direct and indirect GHG emissions. Even small gains in energy efficiency at our refineries have a significant impact on overall company emissions. After crude oil, energy is the single largest expense for our refineries, so there is ample economic incentive to be as energy-efficient as practicable. As a result, we consider energy efficiency an opportunity that provides significant financial and environmental benefits. Our energy-efficiency efforts have enabled us to avoid emitting millions of tons of GHGs per year. For instance, our refineries have reduced GHG emission intensity (the amount of emissions for a given quantity of product manufactured) by approximately 20 percent since 2002 while increasing overall throughput by more than 480,000 bpd.

In 2010, we established a “Focus on Energy” initiative to improve the efficiency of refineries. The program brought energy coordinators, unit engineers and process technologists together to identify energy control points for each process unit, energy optimization envelopes for each point, and measurement of the economic impact when outside the optimum range. Since inception of the program, we have designated an “Energy Technologist” who coordinates the program with a team of dedicated energy specialists at each plant to execute the following:

- Track and communicate more than 600 individual energy metrics systemwide that influence our energy efficiency as measured by the EII. Part of the team’s job is to communicate the economic impact from meeting or not meeting the energy metrics.
- Assess and identify the gap between our refineries that perform at different energy-efficiency levels and develop an energy road map to work toward closing the gaps.

Ensure energy efficiency is designed into, and EII impacts are evaluated for, proposed capital and expense projects.

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

Communicate the importance of energy efficiency so that it becomes part of our culture.

By tracking energy metrics in real time, we ensure that we continually focus on energy. Through this focus, our refineries have achieved significant energy-efficiency improvements and saved approximately $400 million in energy costs over the past 10 years.

In 2017, based on the HSB Solomon Associates’ EII scores, three of our refineries had the best EII performance for their size and complexity and another achieved top quartile performance for its size and complexity. The remaining two refineries achieved 5 percent and 10 percent improvements in their EII scores since 2014. Energy efficiency metrics, like EII, are regularly reviewed by our Refining leadership and executive leadership teams as an ongoing measure of our performance.

The EPA utilizes the EII metric as an eligibility criterion for refineries seeking recognition in its ENERGY STAR Program. Only those refineries that meet the following criteria qualify:

- An EII score within the top 25 percent 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.

As shown on the chart on the next page, MPC is the industry leader in recognition under the ENERGY STAR Program, having earned 75 percent of the total recognitions (42 of the 56). This is an overwhelmingly large share, considering our refineries represent approximately 10 percent of the total U.S. refining capacity. 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.

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10 With the Oct. 1, 2018 acquisition of Andeavor, MPC’s refining capacity is approximately 16 percent of the total U.S. refining capacity. Over the next several years, MPC will begin implementation of its “Focus on Energy” program at these newly acquired facilities.
In 2018, we continued to support the ENERGY STAR Program by hosting an “Industrial Showcase” at our refinery in Garyville, Louisiana. The Garyville refinery, the third-largest refinery in the U.S., is the most energy efficient U.S. refinery in its class based on EII. The showcase brought together the U.S. EPA, the Louisiana Department of Environmental Quality, elected officials (from federal, state and local governments), community representatives and other industrial energy consumers within the area to highlight and share the successes achieved at the Garyville refinery through the ENERGY STAR Program.

U.S. EPA’s ENERGY STAR® Strategic Industrial Energy Advisor Bruce Bremer addresses an Industrial Showcase at MPC’s refinery in Garyville, Louisiana.
Refinery Flare Reduction Initiative: We are also an industry leader in reducing emissions from refinery flares. As part of the EPA’s refinery flare enforcement initiative, we collaborated with the EPA to define a series of operating parameters to ensure flares continuously operate above 98 percent combustion efficiency. We were the first company to produce and publish the results of our own flare performance tests, setting the standard for the use of new measurement techniques and technologies to characterize and reduce emissions from industrial flares. Subsequently, we entered into an agreement with the EPA to reduce flaring emissions at our refineries.

The agreement includes provisions that memorialized the operating parameters to ensure good combustion, source reduction (preventing gases from entering the flare system) and installation of flare gas recovery systems to recover waste gas that has entered the flare system so it can be put to beneficial use as fuel gas within the refinery. Recovering these gases reduces reliance on purchased natural gas, lowering overall GHG emissions.

By the end of 2017, our flare efficiency improvements resulted in a 90 percent reduction in emissions of volatile organic compounds, an 87 percent reduction in emissions of hazardous air pollutants, and a 58 percent reduction in GHG emissions from flaring emissions compared to 2007 levels, which was the baseline year for the flare performance studies. Flare gas recovery systems are currently being installed at two additional refineries, and all are scheduled to be operational by the end of 2018, reducing GHG emissions further. In total, we will have invested more than $375 million on projects that reduce flaring. The value of the gas streams we recover is approximately $20 million per year.

Recovering Off-Gases for Petrochemical Feedstocks: Over the past several years, we implemented projects at our Garyville, Louisiana, refinery, and our Galveston Bay refinery in Texas City, Texas, to recover off-gas from multiple refinery process units. Process off-gases, which include large volumes of ethylene, ethane and heavier materials, were previously sent to fuel gas systems and used as fuel in heaters and boilers throughout the refineries. With these recent projects, the gases are now isolated and sold as petrochemical feedstock – the building blocks for plastics and other valuable products – at a premium over the equivalent cost of fuel gas. By removing these more GHG-intensive materials from the fuel gas system and replacing them with natural gas, we have reduced overall GHG emissions by over 100,000 metric tons.

“TODAY’S AGREEMENT WILL RESULT IN CLEANER AIR FOR COMMUNITIES ACROSS THE SOUTH AND MIDWEST. BY WORKING WITH EPA, MARATHON HELPED ADVANCE NEW APPROACHES THAT REDUCE AIR POLLUTION AND IMPROVE EFFICIENCY AT ITS REFINERIES AND PROVIDE THE U.S. WITH NEW KNOWLEDGE TO BRING SIMILAR IMPROVEMENTS IN AIR QUALITY TO OTHER COMMUNITIES ACROSS THE NATION.”

CYNTHIA GILES, FORMER ASSISTANT ADMINISTRATOR FOR EPA’S OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE, APRIL 2012

![Refinery Flare Emissions Reductions](image)
**Cincinnati Renewable Fuels:** By applying the same principles we use at our refineries to our Cincinnati, Ohio, biodiesel plant, we have been able to reduce our energy intensity by over 30 percent since purchasing this facility in 2014. As a result, in April 2017 the EPA recognized the biodiesel facility for achieving the ENERGY STAR Challenge for Industry, which recognizes plants that achieve at least a 10 percent reduction in energy intensity within five years. In addition to the energy savings already realized, our energy team has begun to develop an energy road map, just like those developed for our refineries, to identify efficiency measures to implement.

**LOGISTICS AND STORAGE**

Our Logistics and Storage (L&S) business has made several noteworthy improvements in energy efficiency over the last few years.

**Vapor Recovery Unit Upgrades:** We have upgraded to Vapor Recovery Units (VRUs) at many of our terminal facilities replacing vapor combustion units (VCUs). VRUs collect fuel vapors during loading activities whereas VCUs combust them. In addition, by installing Continuous Emission Monitoring Systems (CEMS) with Smart Start® VRU processing equipment, the VRUs only operate when needed. The direct power savings in 2017 alone topped $800,000 with the added benefit of reducing GHG emissions. In addition to the reduced power usage, the emission monitoring capability provides additional compliance assurance.

**Transportation Fleet Efficiency:** We are also a partner company in the EPA's SmartWay Transport Partnership, which recognizes the best-performing freight carriers for GHG efficiency. To achieve this milestone, our transport operations began installing low rolling resistant tires along with other aerodynamic improvements, such as modified mud flaps. We also installed DriveCam® and GEOTAB driver-assist systems that monitor and moderate driver behavior (such as fast acceleration, hard braking, speed and excessive idling) to increase our vehicle fleet’s safety and efficiency. Finally, we have optimized delivery routes to minimize transport of empty loads. These improvements reduce overall fuel usage, lowering GHG emissions.

**Pipeline Power Optimization:** Beginning in 2017, our pipeline operations implemented a power optimization initiative, which provides analysts at our pipeline operations center tools to select the most efficient pumps at any given time. By selecting the right flow rate and pump combination, we are optimizing our energy usage to efficiently meet customer demands. Within our pipeline and terminal operations, we have also begun implementation of a multiyear program to replace lighting fixtures with LED lighting at tank farms and booster stations, as well as inside buildings and warehouses. We also consider energy-efficiency improvements during the planning phase for major maintenance and capital projects.
**Marine Fuel Optimization:** We have continued implementing fuel optimization for our inland marine vessel fleet, a program we started in late 2015. Our Marine organization determined fuel consumption was highest while vessels were operating at higher speeds. By moderating speed as little as 1 to 2 mph, on average, Marine projected it could reduce fuel consumption between 10 and 20 percent annually. By implementing a default speed limit and a real-time dashboard for captains to track key performance metrics, fuel efficiency increased by approximately 20 percent during 2016 and 15 percent in 2017, saving over 1 million gallons of diesel fuel per year and avoiding over 10,000 metric tons of annual GHG emissions. In 2017, we expanded the fuel optimization program to our “blue water” fleet through our joint venture with Crowley Maritime Corporation. In 2017, this program saved an additional 1.18 million gallons of diesel fuel and prevented 10,000 tons of GHG emissions.

**SPEEDWAY**

In 2014, Speedway implemented a program to retrofit the exterior lighting at its convenience stores to LED lighting. On average, this initiative lowered the total electric usage by about 12 percent per store. Through the end of 2018, over 95 percent of Speedway stores will be equipped with exterior LED lighting. In addition to exterior lighting, Speedway is currently evaluating a similar LED retrofit program for lighting behind price signs, reader boards and interior store lighting. In 2016, Speedway revised its construction standard for new stores and remodels to require installation of LED lights for interior store lighting as well. Speedway also utilizes ENERGY STAR branded equipment for all new stores, including: ice machines, dishwashers, ovens, receipt printers and office computer systems. We also specify LED lighting for both indoor and outdoor fixtures and utilize variable frequency drive motors in our HVAC condensers. Finally, we are testing sensor technology on our equipment, which provides usage data for analysis on equipment performance.
NATURAL GAS GATHERING AND PROCESSING

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.” Recognizing this, our natural gas gathering and processing (G&P) organization is continuing to implement measures to reduce volatile organic compound (VOC) and methane emissions throughout our operations. These measures are designed to ensure that natural gas is gathered, processed and delivered through our system as efficiently as possible. Examples of some of these measures include:

- We entered into an agreement with EPA to implement design and operating improvements from pipeline launcher and receiver stations that are expected to reduce emissions from these operations by 85 percent. As part of the agreement, we will be sharing our proprietary designs, along with training material, to promote these emission reduction techniques with other oil and gas operators.

- Through a separate agreement with the EPA, we are adopting enhanced measures to reduce fugitive emissions at 20 of our gas processing and fractionation facilities. These measures include lowering the detection limit we use within our leak detection and repair (LDAR) program and broadening the types of equipment we monitor. We are also adopting enhanced design standards that include low-leak technology on valves and connectors. These collective measures are expected to reduce fugitive VOC emissions by over 1,500 tons and fugitive methane emission by over 2,300 tons, which is equivalent to more than 50,000 tons of CO2.

- We are phasing out the use of high-bleed pneumatic controllers throughout our Utica and Marcellus operations by replacing them with lower-emitting devices.

Collectively, these innovative design modifications and commitments will continue to lower the VOC and methane emissions throughout the G&P distribution system.

HEADQUARTERS OFFICE CAMPUS

In a construction program that concluded this year, we renovated and expanded our corporate headquarters in Findlay, Ohio. We took this opportunity to substantially increase the energy efficiency of the campus. Some of the energy-efficiency measures include: replacing windows with high-efficiency windows; replacing existing light fixtures with LED lighting and installing smart lighting and motion detectors that automatically adjust lighting based on lighting needs; replacing the doors on our loading docks with high-efficiency doors to reduce the influence of outdoor conditions on our indoor environment; and upgrading the central utility system with a plate and frame exchanger system that reduces the amount of energy needed to cool the campus. We are currently developing a long-term strategy to upgrade the heating, ventilation and air conditioning systems across the entire campus.

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Environmental Metrics

GREENHOUSE GAS EMISSIONS

In addition to our EII performance, we analyze several other greenhouse gas metrics including greenhouse gas emissions and intensity on a company-wide basis (see graphs below):

We have reduced our greenhouse gas intensity significantly since 2002 through energy efficiency measures and the diversification of our portfolio. Specifically, our Focus on Energy initiative has enabled our refining capacity to increase by approximately 480,000 barrels per day, equivalent to the sixth-largest refinery in the U.S. without significantly increasing GHG emissions. In addition, our natural gas processing and fractionation facilities have lowered our company-wide greenhouse gas intensity since acquisition in late 2015. Overall, our energy efficiency efforts have enabled us to avoid emitting millions of tons of GHGs per year.

12 Environmental metrics do not include data from former Andeavor or ANDX assets.

13 Throughputs are based on a common barrel of oil equivalent of 5.8 million British thermal units per barrel.

14 Includes data from all operating components. 2002 baseline includes estimated GHG emissions and throughput for the Galveston Bay Refinery prior to MPC ownership. MPLX G&P, acquired Dec. 4, 2015, is included in 2016 & 2017 data.
CRITERIA POLLUTANT EMISSIONS\textsuperscript{15}

MPC works to minimize and reduce criteria pollutant emissions aided by the energy efficiency and flare reduction programs described previously. The success of these efforts is demonstrated in the graphs to the right. Just one example is at our Galveston Bay refinery, where we are replacing existing heaters with new ones equipped with state-of-the-art emissions controls. By investing in new heaters, we expect to reduce nitrogen oxide emissions by over 370 tons per year.

From 2002 to 2017, we have reduced our criteria pollutant emissions per common barrel of throughput by roughly 70 percent. Such improvements in emissions intensity are not achieved without significant expense. We have invested over $700 million to achieve these dramatic results.

As described on Page 28, we are making ongoing improvements within our gathering and processing operations designed to further reduce fugitive emissions.

\textsuperscript{15} The Clean Air Act includes six pollutants designated as criteria pollutants: particulate matter (PM), ground-level ozone (O\textsubscript{3}), carbon monoxide (CO), sulfur dioxide (SO\textsubscript{2}), nitrogen dioxide (NO\textsubscript{2}) and lead. Volatile organic compounds (VOCs) are a precursor to ground-level ozone, and as such are regulated by the EPA. MPC operations typically emit and report on SO\textsubscript{2}, NO\textsubscript{x}, VOCs, CO and PM. The 2002 baseline data includes reported emissions for the Galveston Bay refinery prior to MPC ownership. All operating assets are included. Emissions from MPLX G&P, acquired Dec. 4, 2015, are included in 2016 and 2017, which accounts for the increase.
Physical Risks
to our Facilities

EMERGENCY PREPAREDNESS
AND RESPONSE

Through our more than 130-year history of successful operations, we have learned a simple fact – unexpected incidents, such as hurricanes and other market disruptions, can affect our operations and business. How well we prepare for and respond to such incidents, however, is under our control.

We have a dedicated Emergency Preparedness Group (EPG) that plans and maintains our ongoing ability to respond rapidly and appropriately to emergency incidents anywhere the company has operations. The EPG staff works closely with all our business components to achieve both regulatory compliance and implementation of best practices. With assistance from the EPG, our operational locations maintain site-specific emergency preparedness and response plans. Refineries and other facilities also identify crews to secure the facility when a weather event is imminent, and a team to resume normal facility operation after a storm passes. These location-specific response plans are also subject to regular drills and exercises to enable 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 160 professionals throughout the company with response expertise and training in the Incident Command System, a globally recognized organizational structure providing for the development of plans and the integration of all resources across multiple agencies and organizations to respond to any emergency event. CERT members participate in an annual training exercise, simulating an incident that significantly impacts our operations, the environment and the community. As in a real incident, CERT drills involve federal organizations, such as the EPA or the U.S. Coast Guard; state environmental protection or wildlife agencies; and local emergency responders, such as fire departments and law enforcement.
We go to great lengths to safely maintain our operations throughout severe weather and to quickly recover. We have agreements in place for alternate workspace, necessary office equipment and multiple means to maintain internet and telephone connectivity, even during prolonged power outages. We have agreements for needed supplies like 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 and contractors.

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.

The effectiveness of our CERT and BRT was demonstrated on multiple occasions in 2017 associated with the landfall of Hurricane Harvey and subsequent flooding along the Texas Gulf Coast, and Hurricane Irma impacting Florida. We are extremely proud of our response efforts, which we summarized in last-year’s Perspectives on Climate-Related Scenarios report. Even though our teams functioned extremely well during these incidents, we conducted post-event audits where we identified improvements that we have incorporated into our program to make our emergency preparedness and response activities even better.

HARDENING AND MODERNIZING FOR PHYSICAL RISKS

Physical risks associated with extreme weather events, such as hurricanes, floods and drought, is another risk area we continue to address. With refineries, pipelines, dock facilities and other assets in areas periodically subjected to extreme weather, we have ample operational, safety, environmental and financial reasons to harden against damage to ensure resiliency. Some of the measures we have implemented are described below.

**Control Rooms and Other Critical Buildings:** In 2007, we began a modernization program to address the siting, projected growth needs and enhanced protection needs of control rooms and other critical buildings at our refineries, especially those on the U.S. Gulf Coast due to their exposure to hurricanes. We have upgraded control rooms and other critical buildings at our refineries in Canton, Ohio; Catlettsburg, Kentucky; Garyville, Louisiana; and Texas City, Texas. Due to their location on the U.S. Gulf Coast, our Garyville and Texas City control rooms are elevated above grade to avoid flood damage and built to withstand wind and storm surges characteristic of the most extreme weather in their locations. For instance, the Galveston Bay refinery operations control center is built to withstand winds from a Category 5 hurricane.
Electrical Infrastructure and Power Supply: We continue to proactively implement a multiyear program to replace and upgrade electrical infrastructure at our refineries. Improvements include, but are not limited to, cable replacement, high-resistance ground installations, combining substations, installing new safety features and elevating infrastructure to avoid flooding. Our refineries on the U.S. Gulf Coast each have redundant power supplies and historically have experienced few problems maintaining power during severe weather events, including hurricanes. Our other facilities historically exposed to hurricanes or other severe weather – such as fuel terminals and pipeline stations – elevate power infrastructure above historic flood levels and maintain a combination of on-site generators and contracts for rapid procurement of generators in the event of power loss. Notably in 2017, all our operations in the greater Houston area maintained power throughout Hurricane Harvey and its aftermath.

Flood Control: Our refineries on the U.S. Gulf Coast are also protected from storm surges, high waves and flooding by infrastructure currently in place, with more being planned. Our Galveston Bay refinery in Texas City, Texas, is already well-protected by a levee, ranging in height from 19 to 23 feet, which protects 36 square miles of land in the Texas City area. This levee has provided adequate protection through several storms, including Hurricane Ike in 2008, which was accompanied by an unprecedented Category 4 storm surge, and Hurricane Harvey in 2017, which was accompanied by record rainfall and region-wide flooding.

Neither of these major storm events caused any significant flood or wind damage to our Galveston Bay operations. During Hurricane Harvey in 2017, our Galveston Bay refinery continued to operate throughout the storm, albeit at reduced rates due to interruptions at the ports and pipelines that supply crude to the refinery and transport finished products from the refinery. Because the storm did not directly cause the refinery to shut down, we were able to quickly increase throughput as ports and pipelines reopened.

Our Garyville refinery is favorably located on a local high point, which provides a natural barrier to flooding. The refinery is also protected by a levee along the Mississippi River and is near several spillways both upstream and downstream of the refinery.

Beyond government initiatives, we have implemented safeguards at our U.S. Gulf Coast facilities, including elevating most pumps and compressors on foundations and adopting hurricane preparedness measures that we intend to implement well before a storm has a chance to impact operations.
**Water Availability:** The availability of clean fresh water is vital to the operation of our refineries. 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. Although most of our operations are in areas where water stress is relatively low, we recognize that responsibly managing our use of fresh water is critical to our business, society and the environment. As a result, we dedicate several positions companywide to ensuring our utility and wastewater systems are not only compliant with relevant laws and regulations, but continually optimized for performance.

Over the last 15 years, our Refining organization has invested hundreds of millions of dollars to optimize and improve our water systems and wastewater treatment plants. Our refineries utilize closed-loop cooling-water systems, implement technologies to reduce water loss, and have optimized and upgraded steam systems to reduce steam leakage. Other operations, such as the vast majority of our gas processing facilities, are designed with air cooling units, referred to as fin fans, rather than cooling towers that rely on fresh water. Our terminal and pipeline organizations also reuse water for hydrotesting tanks and pipelines where feasible, rather than discharging the water after each use.

Since taking ownership of our Galveston Bay refinery in 2013, we have been implementing a water optimization program that has already reduced water consumption by over 750 gallons per minute. Some of the initiatives include: repairing steam system leaks, which also has the added benefit of increasing energy efficiency; and using treated effluent instead of raw water for hydrotesting some of our large storage tanks. We are currently studying a reverse osmosis process that would enable the reuse of treated wastewater effluent in the refining process. This effluent reuse could potentially reduce water usage by another 4,000 gallons per minute and make operations more sustainable in the event of drought.

At our refinery in Detroit, Michigan, we are currently piloting a reverse osmosis system that recycles approximately 300 gallons of wastewater per minute, with plans to increase to 1,200 gallons of wastewater per minute, reducing water usage at the refinery significantly.

**CONSERVING RESOURCES**

**Steam Traps**
- As steam cools in transfer lines, it condenses into water, which we collect to reuse in our boilers. This reduces our overall water demand.
- Because the condensed water is already heated, we don’t have to use as much energy to reheat it for its next use.
- This reduces energy costs and greenhouse gas emissions by reducing our fuel needs.
- By ensuring that we minimize steam leaks and optimize the amount of steam that is produced, we reduce water and energy consumption.

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**Refining Water Withdrawal**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cubic meters per thousand bbl of throughput</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>123</td>
</tr>
<tr>
<td>2016</td>
<td>125</td>
</tr>
<tr>
<td>2017</td>
<td>119</td>
</tr>
</tbody>
</table>

* Does not include potable water used in office buildings or former Andeavor refineries. Our refineries use more than 98% of the water we withdraw. Responsibly managing use of fresh water is critical to our business, so we are continually working to reduce consumption.
With the projected continuing global demand for oil and gas, MPC is positioned to remain a successful company well into the future, even under the IEA’s hypothetical Sustainable Development Scenario (SDS). Our Board of Directors 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 our petroleum refineries and other assets. Energy efficiency is a key MPC strategy and is the most important factor in reducing greenhouse gases and other emissions in both the New Policies Scenario and SDS. Improved energy efficiency also makes economic sense and contributes to our cost-competitiveness.

- 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 MPLX and ANDX well-positioned to take advantage of that growth.

- Establish new markets for our gasoline and distillate products through increased export capacity. This strategy will enable MPC to market more of our gasoline and distillate production in other areas of the world, including non-OECD countries where demand for transportation fuel is expected to increase in both the short and long term, even in the SDS.

- 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 execute a strategy to increase in-store gross margins at our Speedway retail locations through prepared food and merchandise sales.

- Continue to conserve fresh water resources and reduce water consumption in areas where there is a potential for water scarcity that could 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.
The table below shows how the disclosures in this report align with the recommendations of the Financial Stability Board’s Task Force on Climate-Related Financial Disclosures (TCFD), as the TCFD has described the categories and where the relevant information can be found in this report.

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<thead>
<tr>
<th>TCFD RECOMMENDATION</th>
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<td><strong>GOVERNANCE</strong></td>
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<tr>
<td>Disclose the organization’s governance around climate-related risks and opportunities.</td>
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</tr>
<tr>
<td>a) Describe the board’s oversight of climate-related risks and opportunities.</td>
<td>Corporate Governance: Board of Directors</td>
</tr>
<tr>
<td>b) Describe management’s role in assessing and managing climate-related risks and opportunities.</td>
<td>Corporate Governance: Executive Leadership</td>
</tr>
<tr>
<td><strong>STRATEGY</strong></td>
<td></td>
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<tr>
<td>Disclose the actual and potential impacts of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning where such information is material.</td>
<td></td>
</tr>
<tr>
<td>a) Describe the climate-related risks and opportunities the organization has identified over the short, medium and long term.</td>
<td>Strategy and Scenario Planning Conclusions</td>
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<tr>
<td>b) Describe the impact of climate-related risks and opportunities on the organization’s businesses, strategy and financial planning.</td>
<td>Refining and Marketing Company-Owned Retail Midstream</td>
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<tr>
<td>c) Describe the resilience of the organization’s strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.</td>
<td>Strategy and Scenario Planning</td>
</tr>
<tr>
<td><strong>RISK MANAGEMENT</strong></td>
<td></td>
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<tr>
<td>Disclose how the organization identifies, assesses and manages climate-related risks.</td>
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</tr>
<tr>
<td>a) Describe the organization’s processes for identifying and assessing climate-related risks.</td>
<td>Corporate Governance</td>
</tr>
<tr>
<td>b) Describe the organization’s processes for managing climate-related risks.</td>
<td>Risk Management Physical Risks</td>
</tr>
<tr>
<td>c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization’s overall risk management.</td>
<td>Risk Management</td>
</tr>
<tr>
<td><strong>METRICS AND TARGETS</strong></td>
<td></td>
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<tr>
<td>Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.</td>
<td></td>
</tr>
<tr>
<td>a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.</td>
<td>Energy Strategy and Performance</td>
</tr>
<tr>
<td>b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.</td>
<td>Environmental Metrics</td>
</tr>
<tr>
<td>c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.</td>
<td>Energy Strategy and Performance</td>
</tr>
</tbody>
</table>
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,” “position,” “pursue,” “prospective,” “predict,” “project,” “potential,” “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 are difficult to predict. Factors that could cause our actual results to differ materially from those implied in the forward-looking statements include: the risk that the cost savings and any other synergies from the Andeavor transaction may not be fully realized or may take longer to realize than expected; future levels of revenues, refining and marketing margins, operating costs, retail gasoline and distillate margins, merchandise margins, income from operations, net income or earnings per share; the regional, national and worldwide availability and pricing of refined products, crude oil, natural gas, NGLs and other feedstocks; consumer demand for refined products; our ability to manage disruptions in credit markets or changes to our credit rating; future levels of capital, environmental or maintenance expenditures, general and administrative and other expenses; the success or timing of completion of ongoing or anticipated capital or maintenance projects; the reliability of processing units and other equipment; business strategies, growth opportunities and expected investment; the adequacy of our capital resources and liquidity; the effect of restructuring or reorganization of business components; the potential effects of judicial or other proceedings on our business, financial condition, results of operations, net income or earnings per share; the regulatory, financial, and market conditions; the impact of adverse market conditions or other similar risks to those identified herein affecting MPLX and Andeavor Logistics LP; 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, 2017, and in MPC’s Quarterly Report on Form 10-Q filed for the quarterly period ended June 30, 2018, filed with the 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, most 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. Copies of MPC’s Form 10-K and Forms 10-Q are available on the SEC website, MPC’s website at http://ir.marathonpetroleum.com or by contacting MPC’s Investor Relations office.