

Marathon Petroleum Corporation

Summary

Marathon Petroleum Corporation,ⁱ \$52 billion in market capitalization, \$31.6 billion in fixed income securities, 17,700 employees, Ohio-based crude oil refining company. Marathon refines, supplies, markets, and transports petroleum products. The company serves customers in the United States.

Marathon's Refining & Marketing segment, which makes up around 95 percent of the company's total revenue, refines crude oil and other feedstocks at refineries in the US Gulf Coast and Midwest regions, purchases ethanol and refined products for resale, and distributes refined products. It sells refined products to wholesale marketing customers, buyers on the spot market.

The facility in question is Marathon's Detroit Refinery.ⁱⁱ

The refinery, located in the Boynton neighborhood in southwestern Detroit Michigan, has a capacity of up to 140,000 barrels of crude oil per calendar day (bpcd). The Detroit refinery processes sweet and heavy sour crude oils into gasoline, distillates, asphalt, fuel-grade coke, chemical-grade propylene, propane and slurry.

In 2012, Marathon completed the Detroit Heavy Oil Upgrade Project (DHOUP), which enabled the refinery to process up to an additional 80,000 bpcd of heavy sour crude oils, including Canadian crude oils, and oils specifically from Canadian tar sands.

The extracted oil product, bitumen, is treated with chemicals to allow it to flow as diluted bitumen, or "dilbit". The diluents are usually natural gas condensate, naphtha, benzene (a known carcinogen), or a mix of other light hydrocarbons.ⁱⁱⁱ The exact composition is a trade secret.^{iv}

In 2007, Marathon awarded the engineering firm Fluor a \$2.2 billion contract to upgrade the Detroit refinery to allow it to process heavy Canadian crudes.^v

Marathon touts the enormous strides that the facility and company has made, e.g., receiving Energy Star recognition and reducing emission levels. However, it does not note that the Detroit refinery has been in High Priority Violation under its Clean Air Act permit, stemming from a flare system malfunction in February 2019 which caused release of sulfide and mercaptan vapor; there had also been eight emission violations dating back to 2017. As a result of the Detroit facility Boynton has been labeled "Michigan's dirtiest zip code".^{vi} The refineries U.S. EPA data is available in the endnotes.^{vii}

Overall, for 2020, Marathon Petroleum Corporation reported total Scope 1 and Scope 2 of 40.2 million mtCO₂e, and Scope 3 emissions 352 million mtCO₂e or 417 million mtCO₂e for Scope 3: Refining Yield Method or Scope 3: Marketing Method respectively.^{viii}

Company Overview

Marathon Petroleum Corporation operates as a crude oil refining company. The Company refines, supplies, markets, and transports petroleum products. Marathon Petroleum serves customers in the United States. The company distributes petroleum products wholesale to private-brand marketers and to large commercial and industrial consumers, as well as to the spot market. It completed the \$21 billion sale of Speedway, its retail transportation fuel and convenience store business to 7-Eleven in 2020.

Marathon's operations consist of two business segments.

Its Refining & Marketing segment, which makes up around 95 percent of the company's total revenue, refines crude oil and other feedstocks at refineries in the US Gulf Coast and Midwest regions, purchases ethanol and refined products for resale, and distributes refined products. It sells refined products to wholesale marketing customers, buyers on the spot market.

The Midstream segment (5 percent of revenue) transports crude oil and other feedstocks to Marathon Petroleum's refineries and other locations, delivers refined products to wholesale and retail markets and affiliated pipeline assets and investments.

Marathon holds stakes in MPLX LP which operates the company's asphalt and light oil product terminal operators in the US (about 20 terminals). In addition, the company has a large US private inland product fleet that includes roughly two dozen inland towboats and about 300 barges.

Climate, Community, and Environmental Risks

Climate Risks

The use of oil sands contributes directly to global warming. Producing and processing oil sands results in roughly 14 percent more greenhouse gas emissions than the average oil used in the U.S. And greenhouse gas emissions per barrel have stopped improving and started increasing slightly, thanks to increasing development of greenhouse gas-intensive melting-in-place projects. A byproduct of refining oil sands, the residue left after refining, is petroleum coke, or pet coke that can be substituted for coal. Pet coke emits 30 percent more CO₂ per ton than an equivalent amount of the lowest grade mined coals. Pet coke burning, because it is considered a co-product, is not included in industry estimates of oil sands GHG emissions^x

The evaporation and atmospheric oxidation of low-volatility organic vapors from oil sand emissions is responsible for secondary organic aerosol (SOA) production.^x SOAs contribute to fine-particle pollution linked to lung and heart problems. They are associated with black carbon, which is hastening melting in the Arctic. However, while airborne particulate matter is linked to premature human mortality, the relative importance of the different chemical components for these effects is unknown. Nor are the effects of particulate matter on climate certain.^{xi}

Community Risks

Residents said they believe the refinery's emissions are behind the unusually high rates of cancer and other illnesses in the neighborhood. According to the Michigan Department of Public Health, consistently elevated levels of cancer and mortality rates from cancer were recorded in Boynton's ZIP code, 48217, reported as the most polluted in Michigan. Residents believe that the air quality worsened after the refinery switched from conventional crude oil to oil derived from oil sands. Detroit is subject to winter-time thermal inversions that trap emissions close to the ground, which would amplify poor air quality.

MPC began buying out residential properties adjacent to the refinery in 2021, with plans to raze them and create a green belt to buffer the neighborhood from the plant.^{xii} Wayne County, where Boynton is located, has adult asthma hospitalization rates more than double the Michigan average, and Black Michiganders are heavily impacted.^{xiii}

The Office of the Environmental Justice Public Advocate's Michigan Environmental Justice Screen tool (MiEJScreen) shows the Boynton census tracts as having an environmental justice score of 99 percent, based upon the vulnerability of the population and the degree of exposure to hazardous environmental conditions and health characteristics.^{xiv}

Environmental Risks

The Detroit refinery's air violations include nuisance odors, failing to continuously monitor the flare system, exceeding visible emission limits of particulate matter.

The Detroit refinery signed consent order in January 2021 with the state of Michigan to address long-stemming environmental problems, including more than \$500,000 for community projects (mostly for an air filtration system in a nearby school, and nearly \$40,000 for air monitoring and increased data reporting) in the 48271 zip code and paying the state of Michigan more than \$80,000 in fines.^{xv}

Risks to Investors and Cost to the Company

Costs to Marathon Petroleum Corporation

- Transition risks faced by Marathon include policy and legal risks, including reporting obligations and more intensive regulatory oversight. The implementation of the Paris agreements and the emergence of electric automobiles will gradually make the oil industry obsolete, leaving the potential for stranded assets in outdated oil infrastructure. Consumer preferences and public opinion are gradually turning away from internal combustion engines. Marathon's Detroit refinery sources Canadian tar sands oil via

Southern Lights Pipeline (Line 13) from Edmonton to Duluth and then via Enbridge's Line 5.^{xvi} The final transition risk is reputation. Marathon's is tarred by its violations of the Clean Air Act and its contributions to the creation of one of Michigan's top ten environmental justice hotspots.

- Costs in fines for pollution at Marathon's Detroit refinery are trivial in the context of the economic throughput of this refinery. At full operation, the refinery produces 140,000 barrels per day, or 51,100,000 barrels per year. Each barrel produces somewhere between 400-560 kg CO₂e, depending upon the oil.^{xvii} The refinery processes 80,000 barrels of Canadian Crude a day (@57 percent of its output). If on average, each barrel of oil refined produced 500 kg CO₂e, and the refinery produced 51,100,000 barrels annually, the refinery would produce 25,550,000 mtCO₂e annually. In 2016 the EPA calculated the social costs of mtCO₂e at between \$12 and \$123 for 2020.^{xviii} Selecting a conservative estimate of \$42 in 2007 dollars per mtCO₂e yields a social cost of billions of dollars a year.^{xix}

Risks to Investors

- Marathon should disclose the social costs of carbon (SCC) emitted from its Detroit Refinery. The social cost of carbon estimates the total economic harm associated with emitting one additional ton of carbon dioxide pollution into the atmosphere. In a 2016 ruling the Federal Court of Appeals for the Seventh Circuit affirmed the use of the SCC by the US Department of Energy, and upheld the choices made by the Federal government in calculating the SCC estimate as reasonable and appropriate, despite limitations in the estimates.

References

ⁱ Marathon Petroleum Corporation's ticket is MPC US Equity, FIGI BBG001DCCGR8, ISIN US56585A1025, and the company has 42 corporate bonds, ten loans, one preferred, and seven municipal bond securities.

ⁱⁱ U.S. EPA TRI # 48217MRTHN1300S.

ⁱⁱⁱ <https://www.api.org/oil-and-natural-gas/wells-to-consumer/exploration-and-production/oil-sands/diluted-bitumen>

^{iv} <https://insideclimatenews.org/news/26062012/dilbit-primer-diluted-bitumen-conventional-oil-tar-sands-alberta-kalamazoo-keystone-xl-enbridge/>

^v <https://www.fluor.com/projects/heavy-oil-refinery-clean-fuels-epc>

^{vi} <http://america.aljazeera.com/articles/2014/3/3/michigan-tar-sandsindustryaccusedofactingwithimpunity.html>

^{vii} https://enviro.epa.gov/enviro/tri_formr_partone_v2.get_details?rpt_year=2020&fac_id=48217MRTHN1300S&ban_flag=Y

^{viii} Marathon Petroleum Corporation (2020). *Interactive Performance Data*. <https://sustainability.marathonpetroleum.com/reader/67>

^{ix} David Biello, "How much Will Tar Sands Oil Add to Global Warming?" *Scientific American*, Jan 23, 2013.

<https://www.scientificamerican.com/article/tar-sands-and-keystone-xl-pipeline-impact-on-global-warming/>

^x Liggio, J., Li, SM., Hayden, K. *et al.* Oil sands operations as a large source of secondary organic aerosols. *Nature* **534**, 91–94 (2016). <https://doi.org/10.1038/nature17646>

^{xi} Fuzzi, S., Baltensperger, U., Carslaw, K., Decesari, S., Denier van der Gon, H., Facchini, M. C., Fowler, D., Koren, I., Langford, B., Lohmann, U., Nemitz, E., Pandis, S., Riipinen, I., Rudich, Y., Schaap, M., Slowik, J. G., Spracklen, D. V., Vignati, E., Wild, M., Williams, M., and Gilardoni, S.: Particulate matter, air quality and climate: lessons learned and future needs, *Atmos. Chem. Phys.*, **15**, 8217–8299, <https://doi.org/10.5194/acp-15-8217-2015>, 2015.

^{xii} <https://www.freep.com/story/news/local/michigan/wayne/2020/12/18/marathon-offers-buyout-boyn-ton-residents-near-petroleum-refinery/3964616001/>

^{xiii} <https://www.freep.com/story/news/politics/elections/2019/07/31/cnn-detroit-democratic-debate-most-polluted-zip-48127/1885447001/>

^{xiv} <https://egle.maps.arcgis.com/apps/webappviewer/index.html?id=b100011f137945138a52a35ec6d8676f>

^{xv} https://www.egle.state.mi.us/aps/downloads/SRN/A9831/A9831_ACO_20210201.pdf

^{xvi} Barclays (June 29, 2021). *North America Natural Gas and RefiningInitiate Marathon Petroleum (MPC)at OW*.

^{xvii} Carnegie Oil-Climate Index, <http://oci.carnegieendowment.org/#analysis?opgee=run000&prelim=run01&showCoke=1&ratioSelect=perBarrel&xSelect=prodGasoline&ySelect=downstream>

^{xviii} USEPA, 2016. Social Costs of Carbon. https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html

^{xix} <https://www.in2013dollars.com/us/inflation/2007?amount=1073100000000>