

Louisiana Petrochemical Project Is a Losing Bet for Investors and Local Communities

Tom Sanzillo, Director of Financial Analysis



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Key Findings

If Mitsubishi and the state of Louisiana go forward with a proposed 350,000-ton methyl methacrylate production facility in Ascension Parish, La., the company will likely face negative financial consequences and the government will waste taxpayer dollars.

Slower economic growth, weak project financing, disruptive trade realignments, market challenges, sustainability options and growing public opposition create a risk profile that challenges the Geismar project.

Mitsubishi's stakeholder outreach fails to pass muster in the context of corporate sustainability and human rights concerns.

Multi-layered human rights, environmental and climate issues now tear at the reputational credibility and creditworthiness of large global companies—including Mitsubishi.



Executive Summary

Mitsubishi is making a bet on a proposed new 350,000-ton methyl methacrylate (MMA) production facility at the Geismar site in Ascension Parish, La. It's a big bet—the largest MMA facility in the world.

It's a bad bet. The company seems to know it as it has missed two construction start deadlines and is currently beyond the most recent promise to start construction by the end of the second quarter of 2024.

Louisiana's leadership welcomed the announcement in 2020. Little attention was paid to the potential risks. If Mitsubishi goes forward with the project, the company will likely face negative financial consequences. An investment of approximately \$1 billion (¥143 billion) is equivalent to 47% of the Mitsubishi Chemical Group's 2023 capital expenditure budget.^{1,2} This amount and the company's reputation are at risk. Louisianians, on the other hand, will have lost good land, the right to plan their own communities, clean air, land and water, and taxpayer dollars. What Louisianians give up is, for the most part, irretrievable.

When the project was announced, a final investment decision (FID) was expected in mid-2022 with construction starting shortly after the decision. Commercial operation was slated for 2025. But the FID remains on hold and permits are pending. The company has missed two construction start deadlines so far, despite the state of Louisiana's promises of tax dollars and a supportive permitting environment.

This report reviews the financial risks facing the project. Those risks are discrete in nature, but cumulatively they should tell Mitsubishi that the proposed methyl methacrylate plant is the wrong project, at the wrong place and time, with the wrong financial scenario.

A summary of those risks makes the case.

- The economy is growing at a much slower rate than when the Geismar plant was planned in 2014. A host of factors driven by war and the fear of war—as well as a realignment of markets reflecting globalization and national security tensions—will slow the economy and with it, the growth prospects of many petrochemical commodities, including MMA. Slow growth in the current paradigm impairs profits.
- The MMA market is oversupplied both in the United States and globally. The net result of new capacity additions is likely to lower the utilization rate of U.S. MMA producers—an impact that reflects oversupply and with it, flat pricing and tighter margins. Existing markets will not welcome the new MMA capacity.

¹ ¥ = Japanese Yen, \$ = United States dollar.

² ¥1 = \$0.0075, \$1 = ¥ 143.6

- New plant prospects have weakened. Low-cost natural gas cost spurred a new build trend but the cumulative risk picture of higher cost construction and diminishing off-taker markets has undermined this strength. Several U.S. petrochemical projects have been canceled, delayed, or have confronted regulatory hurdles highlighting the market weakness of large petrochemical investments. Consistent public concerns over environmental and climate issues are gaining credibility with institutional concerns voiced by credit agencies and shareholders posing additional risks.
- Sustainability plans are altering capital investment in traditional MMA production. The Geismar facility relies on fossil fuels. Investments in alternative MMA facilities that no longer rely on fossil fuel feedstocks, as well as the adoption of new PMMA recycling technologies, may absorb market share that traditionally has been the domain of new virgin MMA facilities such as the proposed Geismar project. Ironically, Mitsubishi is a leader in the next wave of fossil-free technologies.
- Geopolitical factors are constraining U.S. exports. Traditional trade routes to Asia and the Middle East are increasingly uncertain, and a host of regulatory and policy factors in Europe are likely to curtail future exports from the United States.
- Mitsubishi's stakeholder outreach fails to meet the test of corporate sustainability and human rights standards.

The strength of the energy transition is a confounding factor for Mitsubishi. The company, like most of the producers of MMA, is moving away from a production process that relies on cyanide, a poisonous substance. The preferred alternative today for MMA production is an ethylene-based production model. The improvement is meant to protect the public and Mitsubishi workers from cyanide. The downside is that ethane (natural gas) is used to produce ethylene, and the process emits significant amounts of greenhouse gas emissions—a step backward for climate change.

Confounding the picture, Mitsubishi and its primary competitor, Röhm, have independently produced a “biofuel” MMA that does not rely on fossil fuels. Experimental success has now led Mitsubishi to commence construction on a biofuel plant in India. With the MMA market oversupplied and economy slowing, there is little need for new capacity, especially using traditional, soon-to-be obsolete technology and production processes. The company has time to improve on the operational performance of its new biofuel plant before the market needs new capacity. These sustainability considerations combine with the risky nature of the project's standalone profitability. During an inflationary period, the cost of the plant has risen, while MMA commodity prices are looking to be relatively flat for the next several years. MMA profits have been sagging for the company and are likely to continue to do so through 2024 and into 2025.

Community sentiment is decidedly in opposition to this plant, a factor that is noted by credit agencies as part of the evolving global outlook for petrochemical facilities. The fact that the proposed plant is sited in Louisiana's Cancer Alley—an area along the Mississippi River between New Orleans and Baton Rouge that is largely populated by African-Americans and has a disproportionately heavy concentration of polluting industrial facilities—means Mitsubishi will be entangled in a decades-long dispute involving issues of racial inequality and environmental justice. Even if Louisiana's state

government approves environmental permits, the project still faces market and political forces that place it at risk.

Mitsubishi's decision to delay the project demonstrates its uncertain status. The two years of "wait-and-see" have brought greater risk in the form of rising construction costs and commodity price stagnation. The choices Mitsubishi makes in this matter will reveal whether the company is committed to an ambitious sustainability plan. The choice will determine whether Mitsubishi will cut emissions or increase them. And the overall decision will reflect the company's commitment at the highest levels to sustainability, human rights and its investors.

I. Background

A. Company: Corporate Structure, Sustainability, Chemical Group and Methyl Methacrylate (MMA)

Mitsubishi Corporation is an international conglomerate that "commercializes new business models and new technologies and develops and offers new services."³ Since the late 1800s, the company has evolved by developing new units and business lines. The company's market capitalization is ¥14.25 trillion, or \$98.9 billion.⁴ The company's 10 units garnered 2023 annual revenue of ¥21.6 trillion, or \$165 billion. The company is broadly diversified, allowing it to benefit from the upside of commodity markets (energy and minerals) while shielding earnings from downside and volatility risk. The company looks to power and food groups to stabilize its corporate profits.⁵

Table 1: Mitsubishi Corporation 2023 Revenues by Business Group

Business Group	JPY(¥) (millions)	USD\$ (millions)
Natural Gas Group	2,004,520.00	14,959.10
Industrial Materials Group	2,602,676.00	19,422.96
Petroleum and Chemicals Solutions Group	3,919,032.00	29,246.51
Mineral Resources Group	3,684,973.00	27,499.80
Industrial Infrastructure Group	739,984.00	5,522.27
Automotive and Mobility Group	1,045,032.00	7,798.75
Food Industry Group	2,417,187.00	18,038.71
Consumer Industry Group	3,412,564.00	25,466.90
Power Solutions Group	1,674,503.00	12,496.29
Urban Development Group	62,666.00	467.66
Other	8,836.00	65.94
Total	21,571,973.00	160,984.87

³ Mitsubishi Corporation. [Annual Financial Report](#). June 23, 2023, p. 48 ("Annual Financial Report"). The corporation reports annually from April 1 through March 31. March 31 is the end of the fiscal year.

⁴ Yahoo Finance. [Mitsubishi](#). May 8, 2024.

⁵ See: Moody's. [Mitsubishi Corporation](#). January 24, 2024. (Paywall)

Source: Mitsubishi [Annual Financial Report](#), p.105.

The Petroleum and Chemical Solutions Group (petchem division) created the most revenue for Mitsubishi in 2023, despite the instability created by COVID-19 and the inflation driven by rising oil and gas prices.^{6,7} The group's primary products have been petroleum, petrochemicals and basic chemicals. The company has used the petchem division to create strategies to take advantage of business opportunities created by the low-carbon transition. Most recently, the company has separated its petroleum work from chemical products.⁸

The MMA unit is part of the larger chemical group. MMA (which has uses in plexiglass, bone replacements and capsules) accounted for 6% of chemical group revenues in 2023.⁹ In 2023, the MMA unit posted a 7.8% EBITDA margin, lagging the chemical group's total consolidated EBITDA of 10.8%.¹⁰ Through the third quarter of 2023, the MMA unit revenues declined from the prior year. During 2023, Mitsubishi lowered the company's EBITDA guidance from 10% to 9.4% of the unit.

Sustainability

In 2022, the company created a "MC Climate Taxonomy." The taxonomy classified all business groups according to climate exposure and strategic direction as part of its planning to alter operations to meet net-zero greenhouse gas emission goals by 2050.

The climate goal is to be integrated with the larger financial goal of steady growth of earnings independent of market factors.¹¹ The 2024 Mid-Year Corporate Strategy plan calls for ¥3 trillion (\$22.5 billion) to be invested in three major areas: Maintaining and expanding its base products, ¥1 trillion (\$7.5 billion) with investment targets in metallurgical coal, food and automobiles; ex-related (Energy Transformation), ¥ 1.2 trillion (\$9 billion) in renewable energy, battery materials and next-generation energy (hydrogen, ammonia biomass); and DX/Growth-related investments (Digital

⁶ As of March 31, 2024, the group has been renamed "Chemicals Solutions Group," reflecting the transfer of Next Generation Energy Business to Next-Generation Energy Business Group. See discussion of new energy priorities and Mitsubishi's plans for net zero. Mitsubishi Corporation. [Connecting to the Future](#). Last visited April 26, 2024.

⁷ [Annual Financial Report](#), p. 14.

⁸ Mitsubishi is a large conglomerate. To position itself to succeed in the marketplace and remain on the cutting edge of innovation, it organizes and reorganizes often. The MMA group is part of the Chemical Group. The Chemical Group consists of Performance Products—which oversees Polymers and Compounds, Films and Molding Materials and Advanced Solution, Chemicals (which includes MMA), Petrochemicals and Carbon Products, Industrial Gases, Health Care and Others. Mitsubishi. See: [Operational Summary for the End of Year](#). March 31, 2023. May 2024 ([OpSum0323](#)).

⁹ [OpSum0323](#), p. 5.

¹⁰ [OpSum0323](#), p.41.

¹¹ Mitsubishi Corporation. [Midterm Corporate Strategy 2024](#). May 10, 2022 ("[2024 Corporate Strategy](#)"). The original development concepts were outlined in Mitsubishi. [Roadmap to a Carbon Neutral Society](#). October 2021, and further amplified in the [2024 Corporate Strategy](#).

Transformation) of ¥0.8 trillion (\$ 6 billion) in supply chain optimization and urban development. The MMA unit was allocated 7% of the chemical group's annual capital expenditure budget in 2023.¹²

Through a host of additional sustainability initiatives, the company is prioritizing renewable energy, next-generation hydrogen fuels, copper, natural gas, and energy management. The company places heavy emphasis on the introduction of renewable energy in its industrial processes, including MMA. In its petrochemical group, the company will introduce “next-generation” energy deploying natural gas to create hydrogen as a feedstock and source of electricity. The Petchem Solutions Group's top sustainability low/zero-carbon initiatives are listed as:

- Developing an ammonia fuel business, first for power generation and then for mobility and industrial applications.
- Creating a carbon capture business that recovers and recycles CO₂ as a feedstock for new fuels and materials.
- Developing and introducing carbon-neutral fuels with biological resources.
- Recycling plastic products.¹³

The short-term emphasis through 2030 will be on “co-firing coal fired power plants, deploying biofuel and biomaterial initiatives.” Part of the company's 2030 energy plan is to maintain a stable supply of natural gas “as a feedstock for next generation energy” through 2050 and to utilize carbon capture and sequestration largely after 2030.¹⁴

The Mitsubishi document specifies the work of the company's “Sustainability Chemical Group” web page in more detail.¹⁵ As a policy matter, the company views environmental and climate change impacts as two separate issues. This factor is particularly relevant since the company appears to be moving away from its reliance on a highly toxic cyanide process and replacing it with ethylene, a compound that increases greenhouse gas emissions. **Neither process is acceptable from a climate and environmental angle and, as this paper shows, the project is financially not viable.**

¹² [OpSum0323](#), p. 37. The Chemical Group's FY 2023 capital budget is ¥283 billion (\$2.1 billion) with a MMA Unit ¥ 21 billion (\$157 million). According to the company's chemical group financial planning documents, the company may actually reduce the MMA unit capital allocation to ¥19 billion, or 5% of its ¥351 billion FY 2024 forecast. See: [OpSum0323, p. 38. The actual timing of the Louisiana project is therefore uncertain since the MMA Geismar project is expected to cost approximately \\$1 billion. Without a clear calendar of all MMA projects and their actual cash demands it remains to be seen if Mitsubishi anticipates any significant progress on the Louisiana project in 2024.](#)

¹³ [Ibid.](#), p. 10.

¹⁴ [2024 Corporate Strategy](#).

¹⁵ Mitsubishi Corporation. [Sustainability](#). Last visited April 8, 2024. The Mitsubishi webpage attempts to integrate a series of sustainability initiatives presented in several documents including the Roadmap and the 2024 Corporate Strategy. These initiatives are carried out by several different units in Mitsubishi. Since 2021 those units have been reorganized under different organizational initiatives that support the company's innovative efforts to find new feedstock configurations and to increase the use of renewable energy in the production process.

Chemical Group and MMA Unit

MMA is an operational unit under the Mitsubishi Chemicals Group.¹⁶ The MMA portfolio is integrated into the Chemicals Group's broad business and sustainability goals in three ways:

1. Chemical recycling using acrylic resin that is broken down and reused.
2. New manufacturing technologies that use bio-based raw materials.
3. New manufacturing technologies that use fermentation of bio-based raw materials to further PMMA recycling technology and bio-MMA monomers.¹⁷

The company hosts an MMA Research and Development (R&D) center in Hiroshima. Its current focus includes:

1. Developing a high-performance catalyst for the manufacturing of MMA that improves plant competitiveness.
2. Using an enzymatic method to produce acrylamide. Mitsubishi sees acrylamide as a replacement for acrylonitrile, which is a chemical synthesis.
3. Developing transparent resins and optical materials for the information and communication field and to facilitate resin and sheet technology.¹⁸

Through 2025, Mitsubishi has established a 15% EBITDA target for the unit and an 11% return on equity.^{19,20} Although the unit struggles to reach these targets in the current environment, Mitsubishi notes that the returns would be higher were it not for capital cash outlays for its U.S. projects.²¹ The cash outlays for assets that are not yet operational and not producing cash depress the return on equity.

¹⁶ Mitsubishi Chemicals Group, [MMA](#). Last visited May 7, 2024. ("MMA")

¹⁷ [MMA](#).

¹⁸ Mitsubishi. [MMA Research and Development](#). Last visited April 26, 2024.

¹⁹ OpSum23, p. 40

²⁰ OpSum23, p. 43.

²¹ OPSum23, p. 44. Return on Equity is defined as net income over equity. Equity is accounted for when cash is disbursed for a capital asset. During the course of construction, profits are reduced.

B. MMA Production Processes

What Is MMA and How Is it Made?

MMA is a colorless liquid and is highly adaptable to a host of forms. It is a monomer that is easily polymerized to allow for wide application. Three main pathways are used to produce MMA.²²

It is produced mainly by a process based on the reaction of acetone with hydrogen cyanide. (ACH or C3).²³ The ACH process uses acetone (benzene and propylene and phosphoric acid) and hydrogen cyanide. Cyanide is poisonous. This pathway currently constitutes 60% of all MMA supply worldwide. Producers, including Mitsubishi, are looking to close out their ACH capacity in favor of ethylene-driven (C2) and isobutylene (C4) processes.^{24,25} Whether ACH (C3), ethylene-driven (C2) or isobutylene (C4), the current pathways are derived from fossil fuels.²⁶

Mitsubishi and Röhm, two of the largest players in the MMA market, have both announced investments in new green MMA production facilities.²⁷

The basic new green concept is to replace fossil fuel feedstock with bio-based materials. Röhm, for example, has entered into an agreement with OCI Global for the purchase of bio-ammonia.²⁸ The Röhm facility is slated to be built in Texas.

Mitsubishi's bio-based project is based in India.²⁹ If successful, the company plans to use 100% bio-derived materials as feedstock. Additional innovation is taking place to reduce energy consumption and emissions during production. The company has moved beyond an experimental stage. The India facility is expected to be completed and integrated into Mitsubishi's MMA production portfolio by 2026.³⁰

²² Jaber Darabi et. al. [Catalysis for the synthesis of methacrylic acid and methyl methacrylate](#). ResearchGate.net, September 2018.

²³ National Library of Medicine (NLM). [A Review of the Biotechnological Production of Methacrylic Acid](#). 2020. ("NLM").

²⁴ Ethylene-driven production processes are also seen by the company as a cost-reducing innovation. Mitsubishi Chemical Group. [Kaiteki Report 2023](#) ("Kaiteki 2023"), p. 26.

²⁵ Isobutylene is produced as part of a refinery stream from crude oil. It has wide application. The most prevalent is rubber (used in footballs, tires). It is also used as a component of antiviral drugs and certain pharmacological compounds. American Chemical Society. [Molecule of the Week](#). December 19, 2022.

²⁶ Eng, et. al. A Clean and Green Process for the Production of Methyl methacrylate and methacrolein from [Biofuels](#). 2014.

²⁷ Indian Chemical News. [Mitsubishi to build MMA pilot plant using bio-based materials](#). February 18, 2022. Also see: Röhm.com. [OCI Global and Röhm announce pioneering product of methyl methacrylate \(MMA\) using bio-ammonia](#). November 15, 2023. ("MMA bio").

²⁸ [MMA bio](#).

²⁹ India's policy initiatives in the biobased feedstock MMA area have added to the attractiveness of the company positioning this experimental plant in India. See: IEA. [India could triple its biofuel use and accelerate global deployment](#). Last visited April 26, 2022.

³⁰ Mitsubishi Chemicals Group. [MMA](#). Last visited April 14, 2024.

What Is MMA Used For?

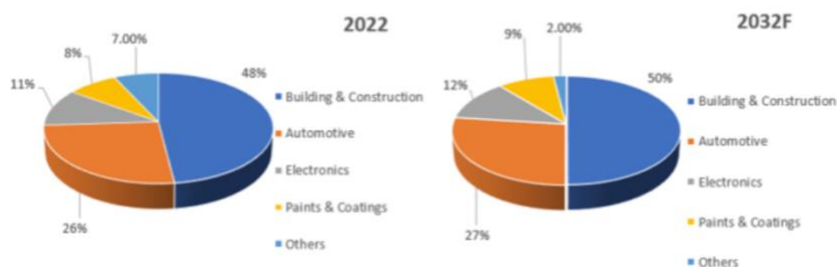
MMA has a wide variety of applications. In building and construction, it is used in cement, adhesives, paints, plexiglass, and textiles. MMA is found in consumer products including automotive plastics, television and electronics screens, optical devices, dental and orthodontic products, pharmaceuticals, signage and road markings, lighting, windows, and household acrylic paints and coatings.

More than half of all MMA is used to produce PMMA, which is made from methyl acrylate.³¹ It is an amorphous and transparent polymer made from the MMA monomer. It takes the form of pellets, extruded material, and cast sheets.³² PMMA is used in bone replacements, bone cement (in dentistry), lenses, shatterproof glass, medical delivery systems and certain skin treatments.³³

PMMA waste is also a recyclable feedstock that can be chemically transformed into pure MMA and recycled as a replacement for virgin product.³⁴ The European Union has sponsored a consortium to develop the process and standards.³⁵ Currently, there are small experimental plants. The second-largest application of MMA is for production of paints and coatings, and various electronic and automotive products.

Figure 1: End Use of MMA 2022 and 2032F

Methyl Meth Acrylate (MMA) Market Share, By End-Use, By Volume, 2022 & 2032F



Source: ChemAnalyst. [Methyl Methacrylate Market Analysis](#).

Note from original source: the figures depict dummy data.

The mechanical properties of MMA open it to a wide variety of uses. Its principal characteristics are transparency and flexibility. These characteristics are enhanced with various chemical additives to adjust static accumulation, improve defogging capability, or improve or decrease conductivity.³⁶ The

³¹ Xometry. [Acrylic-PMMA](#). Last visited April 26, 2024.

³² PMMA-online.eu. [PMMA types and production](#). Last visited April 14, 2024.

³³ Science Direct. [Volume 1: Polymethyl methacrylate](#). Encyclopedia of Biomedical Engineering. 2019.

³⁴ PMMA-online.eu. [op. cit.](#)

³⁵ MMATWO.eu. [MMA and PMMA life cycle](#). Last visited April 14, 2024.

³⁶ American Chemical Society. [Methyl Methacrylate-Based Copolymers: Recent Developments in the Areas of Transparent and Stretchable Active Matrices](#). October 2022.

range of possible uses for PMMA and MMA in the future are substantial, with several uses directly related to improving energy transference.³⁷

What Are the Environmental and Climate Challenges Facing MMA Production?

Although the acetone/cyanide (C3) process is the dominant mode of production, it is largely seen as a legacy model. Most producers are shifting away from its use and toward ethylene processes. Cyanide, a major ingredient in the C3 process, is a highly poisonous chemical. Its use is environmentally undesirable. Although the use of ethylene is considered more desirable, it poses its own environmental problems and is counterproductive from a climate vantage.

The use of natural gas as a next-stage climate solution for MMA is being confronted with several obstacles. The characterization of natural gas as a climate solution is controversial,³⁸ and few can argue with the methane leakage problem that accompanies its use.³⁹

MMA production facilities are also aging.⁴⁰ For example, Mitsubishi's Memphis, Tenn., facility opened in 1969. New facilities are unlikely to gravitate toward ACH technology, and while ethylene feedstock has more advantages, it is fossil-fuel dependent at a time when low- or no-carbon emissions are a high priority. Mitsubishi has made clear that its policy preference is to replace fossil fuels.

C. The Geismar Methyl Methacrylate Investment in Louisiana: Is Mitsubishi Committed to the Project?

Mitsubishi has begun development of a 350,000-ton per year methyl methacrylate facility in Geismar, La.⁴¹ Announced in December 2020, the project will use alpha technology (ethylene).⁴² The plant is expected to cost \$1.3 billion and directly employ 125 people.⁴³ It will also include a carbon monoxide, methanol, and formalin plant. Community leaders have produced a letter of opposition from a 19-member coalition. The coalition participated at a February 2024 hearing, expressing specific concerns about air pollution and emphasizing the fact that the facility is in the area known as "Cancer Alley."⁴⁴

³⁷ *Ibid.*

³⁸ Inside Climate News. [EQT Says Fracked Gas Is a Climate Solution, but Scientists Call That Deceptive Greenwashing](#). March 2024.

³⁹ Massachusetts Institute of Technology Review. [Methane leaks in the U.S. are worse than we thought](#). March 13, 2024.

⁴⁰ S&PGlobal.com. [Challenges in the Global Methyl Methacrylate Market](#). September 6, 2018.

⁴¹ Opportunity Louisiana.gov. [Mitsubishi chemical announces potential project in Louisiana](#). December 8, 2020 ("LEDMMMA").

⁴² The company has recently announced the closure of its 105,000 MMA plant in Hiroshima. The plant uses the ACH process, the controversial older production method that uses acetone and hydrogen cyanide. See: Chemical and Engineering News. [Mitsubishi to close Hiroshima acrylics and MMA capacity](#). February 2024. Also see: ICIS. [Mitsubishi may make FID on new US MMA plant in Q2](#). February 8, 2024.

⁴³ LEDMMMA. DEQ's announcement stated that the project was being discussed since 2016 and the company would apply for Quality Job and Industrial Tax Exemption.

⁴⁴ Louisiana Illuminator. [Environmental groups oppose \\$1 billion petrochemical plant in Geismar](#). February 3, 2024.

The company applied for benefits under the Louisiana Industrial Tax Exemption Program (ITEP) in March 2021.⁴⁵ The estimated value of the first-year tax benefit is \$17 million.⁴⁶ The tax application assumed the project would start construction in April 2022. The ITEP contract is active, and the actual tax relief will be set upon future filings.⁴⁷

Table 2: Mitsubishi’s Louisiana MMA Project, Critical Project Management Benchmarks and Current Project Status as of May 2024

Date	Event
December 2020	Announcement: FID and construction promised 2022, operational 2025
March 2021	Tax-exempt application; April 2022 construction start
October 2022	Environmental permit application filed; FID deferred to 2023
February 2024	Louisiana Department of Environmental Quality hearing
February 2024	Company promises FID by 2Q – 2024; construction 2024, completion 2028

On Oct. 25, 2022, the company filed its application with the Louisiana Department of Environmental Quality (LDEQ). To date, the LDEQ website project status is pending with no final decision made.⁴⁸ The planned construction commencement date of April 2022 was missed. The company deferred its FID until 2023 due to market volatility.⁴⁹

Construction did not commence in 2023. In early 2024, LDEQ conducted a public hearing. In the public hearing notice, the agency concluded that the project would have minimal impact on the environment. Some took this as evidence that the agency had granted a preliminary approval.⁵⁰ The FID would be put off until the second quarter of 2024 and construction could start then, with commercial operation beginning in 2028.⁵¹

Mitsubishi has PMMA/MMA holdings of approximately 3.8 million tons globally. Its capacity is concentrated principally in China. It also has holdings in the United States (Tennessee), France, Netherlands, United Kingdom, Saudi Arabia, Indonesia, Singapore, and Thailand.

The company recently announced a new Louisiana joint venture with Idemitsu Kosan (Idemitsu) and Proman.⁵² The plan is to manufacture clean ammonia in Lake Charles, La., at a Proman site. The new facility is expected to produce 1.2 million tons of low-carbon ammonia using natural gas feedstock.

⁴⁵ Louisiana Department of Economic Development (DED). [Advance Reports](#). Public Reports Line 14598. Last visited April 28, 2024.

⁴⁶ Louisiana’s Incentive Management System. [Fastlane](#). Public Reports, Industrial Tax Exemption Projects, Mitsubishi, Line 12404, \$17 million, Column “W” (First Year Exemption) and \$1.4 billion Investment (Column “U”).

⁴⁷ *Ibid.*

⁴⁸ LDEQ [Permit application status: pending, AI: 234532](#). Last visited June 11, 2024.

⁴⁹ Mitsubishi Corporation. [The Mitsubishi Chemical Group Defers Investment Decision for Alpha Technology Plant in Geismar, Louisiana](#). October 3, 2022.

⁵⁰ ICIS. [Mitsubishi’s proposed MMA plant reaches regulatory milestones](#). February 6, 2024.

⁵¹ ICIS. [Mitsubishi may make FID on new US MMA plant in Q2](#). February 8, 2024.

⁵² Mitsubishi Corporation. [Clean Ammonia Production Project in Lake Charles, U.S.A.](#) February 27, 2024.

The ammonia would be shipped from Louisiana to Mitsubishi's liquefied petroleum gas (LPG/ammonia) terminal in Japan.

In addition, the company has announced another Louisiana joint venture with Shell.⁵³ The project is a relatively early-stage development process to assess multiple direct air capture (DAC) technologies. Under the moniker of Pelican Gulf Coast Removal Project, the project's first effort is a feasibility study. The study is being underwritten by a grant for the U.S. Department of Energy.

Despite tax incentives and positive regulatory statements from Louisiana, the company continues to equivocate on its commitment to the MMA project. In contrast, it appears the company is moving forward with a separate project in Louisiana. This second new project is for blue ammonia with Proman on another site and new carbon capture technology with Shell.

II. Risks

The Mitsubishi Geismar proposal confronts a series of risks that might be manageable if taken individually. The cumulative impact of these risk factors, however, strongly suggests the project lacks viability.

- The economy is growing at a much slower rate than when the Geismar plant was planned in 2014. A host of factors driven by war and the fear of war—as well as a realignment of markets reflecting globalization and national security tensions—will slow the economy and with it, the growth prospects of many petrochemical commodities, including MMA. Slow growth in the current paradigm impairs profits.
- The MMA market is oversupplied both in the United States and globally. The net result of new capacity additions is likely to lower the utilization rate of U.S. MMA producers—an impact that reflects oversupply and with it, flat pricing and tighter margins. Existing markets will not welcome the new MMA capacity.
- New plant prospects have weakened. Low-cost natural gas cost spurred a new build trend but the cumulative risk picture of higher cost construction and diminishing off-taker markets has undermined this strength. Several U.S. petrochemical projects have been canceled, delayed, or have confronted regulatory hurdles highlighting the market weakness of large petrochemical investments. Consistent public concerns over environmental and climate issues are gaining credibility with institutional concerns voiced by credit agencies and shareholders posing additional risks.
- Sustainability plans are altering capital investment in traditional MMA production. The Geismar facility relies on fossil fuels. Investments in alternative MMA facilities that no longer rely on fossil fuel feedstocks, as well as the adoption of new PMMA recycling technologies, may absorb market share that traditionally has been the domain of new virgin MMA facilities

⁵³ Mitsubishi Corporation. [Participation in a DAC Project in Louisiana, USA](#). April 16, 2024.

such as the proposed Geismar project. Ironically, Mitsubishi is a leader in the next wave of fossil-free technologies.

- Geopolitical factors are constraining U.S. exports. Traditional trade routes to Asia and the Middle East are increasingly uncertain, and a host of regulatory and policy factors in Europe are likely to curtail future exports from the United States.
- Mitsubishi's stakeholder outreach fails to meet the test of corporate sustainability and human rights standards.

A. Economic Growth Is Slow

Slower economic growth into the future diminishes the financial potential of the Geismar project.

Petrochemical production facilities have a long expected useful life. They also require a long lead time. They can take a decade or more from design to the start of construction, and then often two to three years to reach the point of commercial operation. This process adds financial risk for the cash planning, capital deployment, technological design and debt management of a company.

Over the last decade, the petrochemical industry has been faced with unprecedented challenges. The economy has been unstable, and geopolitics has proved to be a powerful and disruptive driver of short-term markets. The energy and petrochemical sectors are faced with competition from alternatives to fossil fuels, as well as changes in production technologies.⁵⁴ The energy sector has also been confronted by increased regulatory and public scrutiny, sometimes resulting in project delays and cancellations.⁵⁵ The world's trading relations are in a state of uncertainty. The impact of these market and political factors has altered corporate cash flow plans and ultimately, the timing, purpose and size of debt issuances. The effect on proposed new petrochemical facilities that are poorly aligned with sustainability goals has also led to negative credit actions.⁵⁶

It is anticipated that petrochemicals will be the driving force behind oil demand.⁵⁷ The oil industry will need to replace the current heavy reliance on automobile transportation as the principal off-taker from the oil refining process.⁵⁸ Natural gas markets also face competition on the power generation and home-heating sides by wind and solar power. Most industrial uses of natural gas are also undergoing scrutiny as more and more companies adopt sustainability plans. This long-term trend

⁵⁴ Mitsubishi cites alternative products as a significant threat to the company's business plans. [Kaiteki 2023](#), p. 41.

⁵⁵ Moody's Investors Service. Shifting environmental agendas raise long term credit risk for natural gas investments, Regulated and Gas Utilities, North America. September 30, 2020. (Proprietary)

⁵⁶ Standard and Poor's. [Formosa Plastics Companies Outlook Revised To Negative From Stable On Weak Profitability; 'BBB+' Ratings Affirmed](#). October 2023.

⁵⁷ International Energy Administration. [The Future of Petrochemicals](#). October 2018.

⁵⁸ CNBC.com. [Every new passenger car sold in the world will be electric by 2040, says Exxon Mobil CEO Darren Woods](#). June 25, 2022.

will have a significant impact on future demand. Global natural gas growth is expected to slow in the medium term and the long-term forecast is uncertain.⁵⁹

Mitsubishi assumes that MMA markets generally follow the gross domestic product (GDP) of a country.⁶⁰ Information about the proposed Geismar project was first disclosed to the public around 2014.⁶¹ The U.S. Department of Energy's 2015 Annual Energy Outlook (AEO) noted that from 1983 through 2013, the average annual GDP increase was 2.8%. The AEO projected the long-term growth rate through 2040 would be 2.4%.⁶²

It is not happening. By 2019, just prior to the COVID-19 pandemic, the AEO had reduced its projection of long-term GDP growth to 1.9%.⁶³ Subsequently, the economy was substantially disrupted by the pandemic that took hold in 2020, and the invasion of Ukraine that began in 2022. As the various changes have worked their way through the economy, the U.S. Department of Energy's U.S. GDP long-term outlook through 2050 is now—five years later—still projected to be 1.9%.⁶⁴

Table 3: United States Department of Energy GDP Outlook 2015 and 2023

Year	GDP Growth Rate
Average annual GDP growth 1983-2013 (Actual)	2.8%
2015 Projected GDP growth through 2040	2.4%
2024 Projected GDP growth through 2050	1.9%

If Mitsubishi can complete construction and open the plant in 2028 or 2029, the economy is expected to be growing at a rate 1% below where it was when the facility was planned circa 2014. The slower GDP outlook is accompanied by other factors discussed throughout this report that weaken the financial rationale for the Geismar plant. Most large, heavy industrial production requires long-term planning. Over time, economic conditions will change—and the risk of long-term decline weighs heavily on a facility that requires a robust growth rate.

⁵⁹ Center for Strategic and International Studies. [How will Natural Gas Fare in the Energy Transition](#). January 14, 2020. See also: International Energy Agency. [Natural Gas Outlook: Medium Term \(Q4-2023\)](#). S&P Global. [IEA cuts 2040 global gas demand forecast sector facing "significant" uncertainty](#). October 13, 2020.

⁶⁰ [Kaiteki 2023](#), p. 41.

⁶¹ Chemicals and Engineering News. [Shale Gas Draws Japanese Plant](#). June 23, 2014.

⁶² [AEO 2015](#).

⁶³ [AEO 2019](#), p. 2.

⁶⁴ [AEO 2023](#) (see interactive Table 20 – Macroeconomic Indicators: Gross Domestic Product). Last visited April 26, 2024.

B. The MMA Market Is Oversupplied

Rising supply has surpassed demand growth and will continue to do so. The MMA market is generally oversupplied in the U.S. and globally. The Geismer plant addition will drive down utilization rates.

In 2023, the global market for MMA was approximately 3.8 million tons.⁶⁵ The Northeast Asia region,⁶⁶ including China, is the largest producer and consumer of MMA in the world.^{67,68} The region accounts for more than half of annual MMA consumption, with China taking 30% of market share. The United States is second to China, consuming 16% of market share. While longer-term estimates vary as to future annual global growth rates,⁶⁹ the five-year pre-COVID actual growth rate from 3.2 million tons in 2015 to 3.6 million tons in 2019 amounts to an average annual growth rate of approximately 2.5%.⁷⁰

The growth of MMA in the United States has typically been lower than the global MMA growth rate.⁷¹ In 2016, U.S. consumption was 607,000 tons. From 2016 until the pandemic,⁷² U.S. demand for MMA increased by 1.0% annually. China's MMA growth during the same period was 5.8% annually.⁷³

In 2020, U.S. producers of MMA commanded 18% of global capacity, at 945,000 tons. All the producers used the cyanide-based technology.⁷⁴ By 2030, it is anticipated that Röhm will close 239,000 tons of capacity at its Westwego, La., facility in 2025,⁷⁵ but will bring an additional capacity of 250,000 tons of ethylene-based MMA online by 2025 (Röhm) at a Texas facility.⁷⁶ Mitsubishi's Geismar facility would add 350,000 tons by 2030 to its existing U.S. production capacity.⁷⁷

It is anticipated that by 2030, the nation's producers will reduce the acetone cyanohydrin pathway to approximately 630,000 tons while adding additional ethylene capacity and a small amount of

⁶⁵ ICIS.

⁶⁶ For the purposes of this paper the Northeast Asia region includes China, Hong Kong, Japan, Macao, Mongolia, North Korea, South Korea, Taiwan, and other parts of eastern Asia.

⁶⁷ S&P Global Commodity Insights. [Methyl Methacrylate](#). Chemical Economics Handbook, April 2023.

⁶⁸ In addition to Mitsubishi, other companies engaged in the production of MMA include Arkema, Sumitomo, Dhalop Chemicals Private Limited, Kuaray Co., Ltd, Asahi Kasei Corporation, Dow Chemical, Huntsman Corp, Evonik, Lotte, Röhm, and Saudi Methacrylates. See Market Research Future. [Methyl Methacrylate](#). Last visited April 27, 2024.

⁶⁹ See, for example: ChemAnalyst. [Methyl Methacrylate Market Overview](#). Last visited April 27, 2024. ChemAnalyst estimates 4.2% annual MMA growth, 2015-3032. See also Virtue Market Research. [Methyl Methacrylate Market](#). Last visited April 27, 2024. Virtue Markets predicts 8.9% growth, 2023-30.

⁷⁰ S&P Global. [Methyl Methacrylate Chemical Economics Handbook](#). Last visited April 27, 2024.

⁷¹ ICIS.

⁷² The U.S. Centers for Disease Control reports that the first case of COVID-19 in the United States was identified on January 20, 2020. CDC. [COVID-19 Timeline](#). Last visited May 11, 2024.

⁷³ ICIS.

⁷⁴ ICIS.

⁷⁵ Röhm. [Rohm announces 2025 shutdown of Westwego plant](#). June 30, 2023.

⁷⁶ Röhm. [Röhm and OGI Chemicals break ground on new world scale methyl methacrylate production plant at Bay Cit., Texas](#). October 27, 2022.

⁷⁷ Mitsubishi also has two 50,000 tpy PMMA plants in Memphis, Tenn., which are expected to maintain production.

chemically recycled MMA (10,000 tons, or less than 1%). U.S. MMA producers will at that point command approximately 17% (1.2 million tons) of the global market by 2030.⁷⁸

U.S. production during the period is expected to grow from 678,000 tons to 826,478 tons, or 22%.⁷⁹ U.S. capacity is expected to grow from 945,000 tons to 1.2 million tons, or 30%. Absent a significant increase in producer exports, IEEFA estimates that U.S. utilization rates can be expected to decline from 72% in 2020 to 67% in 2030.^{80,81}

Table 4: United States MMA: IEEFA Estimated Capacity, Production and Utilization Rates

Year		Capacity	Production	Utilization Rate
2020	Total	945,000	678,000	72%
	Röhm – Minus	160,000		
	Röhm – Plus	250,000		
	Mitsubishi - Minus	155,000		
	Mitsubishi - Plus	350,000		
	Recycling - Plus	25,000		
2030		1,225,500	826,478	67%

Source: IEEFA and independent supplements based on ICIS data.

The U.S. market is not expected to expand beyond its historical norms. The internal change in pathways, greater reliance on natural gas and less reliance on cyanide in the feedstock will change the environmental footprint somewhat.

C. Project Economics Are Weak

Several standalone petrochemical projects in the United States (most in Louisiana) have been delayed or canceled. Construction price inflation, flat commodity prices and a weak market outlook suggest a problematic future for the project.

The bottom line here is that the current market is oversupplied and Geismar would compound the imbalance. With a slower-than-planned growth rate, the oversupply is likely to be protracted. The Geismar project faces a weak market.

⁷⁸ ICIS.

⁷⁹ ICIS.

⁸⁰ ICIS.

⁸¹ IEEFA's estimates for capacity are based on ICIS's estimate of 945,000 tpy of MMA capacity in 2020. The additions and subtractions from the 945,000 estimate are based on information in press releases from companies and an ICIS estimate of recycling. IEEFA used ICIS data for 2020 production and adjusted those numbers by 2% annually through 2030. The 2% is derived from an analysis of production growth from 2010 through 2020 using five- year increments and averaging out. The utilization rate was based on IEEFA's calculation of the 2020 and 2030 utilization rate calculation (total production/total available capacity).

IEEFA's analysis suggests that utilization rates are likely to decrease if the plant is built and placed into commercial operation before 2030. Macroeconomic conditions also raise questions. As a standalone project, the cumulative set of risk factors facing it also undermines its viability.

In September 2020, Moody's identified eight long-term oil and gas projects that were either delayed or canceled.⁸² The analysis was accompanied by an observation that credit judgments of coal, oil and gas infrastructure projects would begin to tighten. The observable pattern was that companies were failing to deliver commercially successful projects even after projects had been announced, often accompanied with the support of political leaders and a package of business incentives. In September 2021, Standard & Poor's observed that political and market forces were evolving in a manner that strongly suggested the credit viability of traditional petrochemical complexes was eroding.⁸³ Since those market warnings were made, several companies have continued to pursue projects only to see them canceled, delayed, or face new regulatory challenges or weak market responses.

The trends in construction costs, a key variable when calculating the potential return to investors, point in the wrong direction. The Federal Reserve Bank of St. Louis estimates that new industrial building construction prices rose by 7.8% annually between 2014 and 2023.⁸⁴ Market estimators suggest that a typical project inflation rate is approximately 3.7% annually for new industrial facilities.⁸⁵

Mitsubishi assumes that MMA projects are expected to record a 7% return on investment (ROI). However, despite periods of volatility (see Table IV), prices have remained relatively flat over the last decade. The trend is expected to continue through 2025,⁸⁶ accompanied by utilization rates in the high 60% range.

The Shell and Sasol cases cited below point to the impact of current market trends on newly opened petrochemical facilities. In brief, rising construction costs increase the equity required to build the plant. Lower-than-anticipated commodity prices result in missed revenue targets. Lower returns result in problems with investors and market confidence.

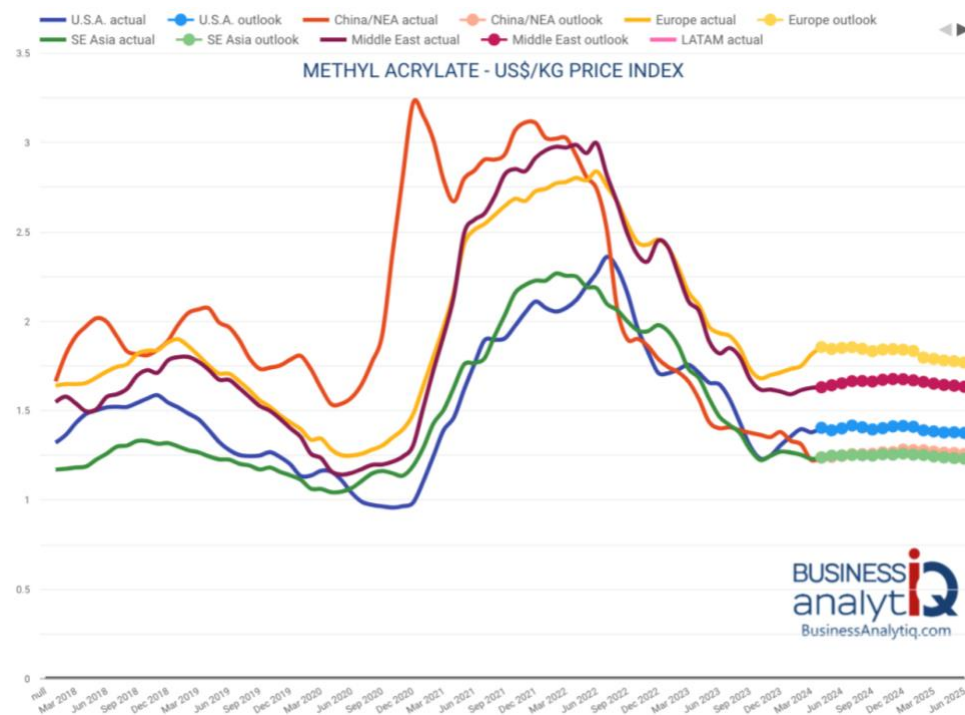
⁸² Moody's Investor Service. Shifting environmental agendas raise long term credit risk for natural gas investments, Regulated and Gas Utilities, North America. September 30, 2020. (Proprietary)

⁸³ S&P Global. [Formosa Plastics Companies Outlook Revised To Negative From Stable On Weak Profitability; 'BBB+' Ratings Affirmed](#). October 2021.

⁸⁴ Saint Louis Federal Reserve. [New Industrial Building Construction](#). Last visited April 27, 2024.

⁸⁵ Construction Analytics: Economics Behind the Headlines (Ed Zarinski). [Category Archives: Inflation Indexing](#). January 17, 2024.

⁸⁶ Business Analytiq.com. [Methyl Methacrylate MMA price Index](#). Last visited May 7, 2024.

Figure 2: MMA Price Index 2018 to the Present and Projection Through 2025

Source: Business Analytiq.com. [Methyl Methacrylate MMA price Index](#).

These trends suggest that a project expecting to enter the market during the period 2027-30 is unlikely to be welcomed by a robust period of growth for petrochemicals generally or the MMA market in particular. The current oversupply of petrochemicals in general in the industry has had a relatively negative impact on several projects.

- Sasol's opening of its Lake Charles polypropylene and polyethylene plant in 2019 resulted in class-action litigation. The company reportedly mismanaged the construction process. The resulting price increases reduced profits. Investors also responded with a class-action lawsuit that was settled for \$40 million.⁸⁷ To offset Sasol's financial stresses, the company brought on a partner by offering an attractive price that reflected the diminished financial status of the plant.⁸⁸
- Big Lake Fuels, LLC has cancelled the permits on its proposed Louisiana methanol project. The notification to Louisiana's environmental agency did not contain a rationale for the move or any mention of plans for the site. Prior to the cancellation, all three credit rating agencies lowered the outlook for BLF's corporate parent.⁸⁹
- PTT Global Chemical Company (PTTGC) plans for an eastern Ohio large petrochemical complex have failed to make progress. PTTGC paid the state of Ohio back for a development

⁸⁷ IEEFA. [Financial risks loom for Shell's petrochemical complex](#). June 4, 2020. See the Appendix for a discussion of the Sasol problems

⁸⁸ Sasol. [Lyondell Basell and Sasol complete Louisiana Joint Venture transaction](#). December 2, 2020.

⁸⁹ IEEFA. [Company turns halt gas methanol project into permanent cancellation](#). April 2024.

grant.⁹⁰ The project remains at a standstill; in June 2023, the company announced another new polyethylene terephthalate recycling center at another Ohio site.⁹¹

- Formosa's plan to build a petrochemical complex in St. James Parish, La., has met with significant opposition. Although the company has recently been awarded a permit, Standard & Poor's has warned the company that pursuing the project could lead to a downgrade.⁹²
- Encina has pulled back from a plan to develop a chemical recycling facility.⁹³ The company stated in its withdrawal notification that it assessed several of its projects that span the globe and found that options for development in other places proved more attractive. The withdrawal by the company came on the heels of a resolution by Encina's town government that opposed the project.⁹⁴
- Shell's petrochemical plant in Pennsylvania opened its doors in late 2022.⁹⁵ The company has since acknowledged higher construction prices and the plant's disappointing market performance. The company pushed back its 2024 revenue goals to 2025.⁹⁶ Recently legal challenges have underscored the earlier credit warnings related to political and market risks. In April 2024, the Pennsylvania attorney general brought criminal charges against the Shell Pipeline Company,⁹⁷ alleging criminal violations of the state's Clean Streams Act occurred during construction of the Falcon Pipeline, a 45-mile pipeline that feeds Shell's newly opened petrochemical facility in Beaver County.⁹⁸ The criminal charges followed citations for civil violations brought by Pennsylvania's environmental agency for violations of the facility's air permit.⁹⁹ The company continues to enjoy tax benefits from the state despite its legal problems.¹⁰⁰
- Shintech Plaquemine withdrew its request for an air permit that would support the company's plan to expand its polyvinyl chloride capacity at the site.¹⁰¹

⁹⁰ The Associated Press. [Firm pays back \\$20M, insists petrochemical project viable](#). March 30, 2022.

⁹¹ Recycling Today. [GCA plans to build PET recycling plant in southeast Ohio](#). June 14, 2023.

⁹² IEEFA. [Formosa needs break its inertia proposed Louisiana petrochemical plant](#). April 2024.

⁹³ Sustainable Plastics. [Chemical recycler Encina cancels Pennsylvania](#). April 2024.

⁹⁴ Plastics News. [Encina Exits Pennsylvania Recycling Plant](#). April 22, 2024, p.3.

⁹⁵ *Ibid.*

⁹⁶ IEEFA. [Shell acknowledges \\$14 billion price tag petrochemical plant, more than double street estimates](#). February 2024. See also [Shell Earnings Transcript](#), February 2, 2024.

⁹⁷ For a complete discussion of the project design and financial assumptions, see: IEEFA. [Financial Risk looms for Shell's Pennsylvania petrochemicals complex](#). June 4, 2020.

⁹⁸ Pennsylvania Environmental Digest. [Attorney General Henry Files Charges Against Shell Falcon Pipeline For Failure To Report Drilling Issues That Caused Industrial Waste, Potential for Water Pollution](#). April 19, 2024.

⁹⁹ Chemical Engineering News. [Shell to pay \\$10 million for permit violations at new cracker](#). June 1, 2023.

¹⁰⁰ Pennsylvania Environment Digest. [PA Taxpayers to Give \\$130.9 Million In Tax Credits To Subsidize Shell Petrochemical Plant In Beaver County: Total Expected To Be \\$1.17 Billion Thru 2042; No Regard For Environmental Compliance Record](#). February 19, 2024. In addition to state tax benefits, Shell also enjoys property tax relief from Beaver County and the Potter Township.

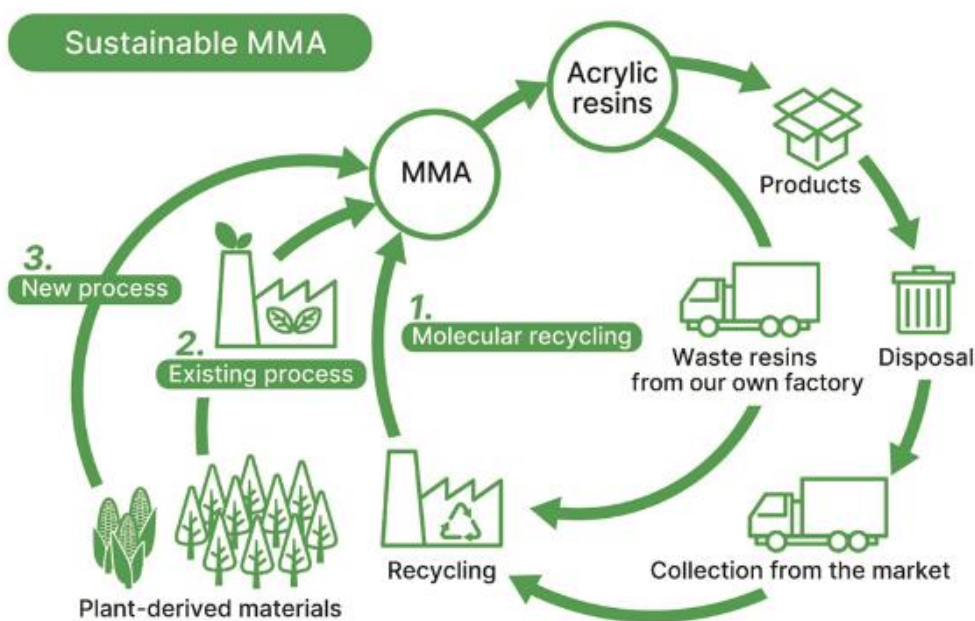
¹⁰¹ Letter from Mindi Fubion Providence Engineering and Environmental Group, LLC., to Bryan Johnston, Air Permits Division, Louisiana Department of Environment, May 28, 2024.

D. Technology for the Geismar Project Is at Risk of Obsolescence

All three current production pathways for MMA rely on fossil fuels. Geismar pathways rely on an ethylene process and face a long-term challenge from advances in plant-derived MMA industrial facilities and chemical recycling.

Currently, three types of technological pathways are used to produce MMA (see above). All three methods rely on fossil fuels. The preferred approach in the current market is the ethylene-based ACH-2 method. Mitsubishi includes this method as part of its sustainability plan,¹⁰² and noted its cost-savings appeal. The company has closed its UK plant, which relied on cyanide as a feedstock. As noted, both Röhm and Mitsubishi have begun using biofuels, with Mitsubishi moving forward with an India-based production facility (See Figure 3).

Figure 3: Mitsubishi Conceptual Design for Plant-Derived MMA Production Model



Source: *Mitsubishi. Design of Pilot Plant for MMA Monomers Using Plant-Derived Materials Has Begun. February 2022 ("Pilot Plant")*.

In addition to the potential of plant-derived materials and technological processes to replace some of the traditional pathways, the sector faces competition from chemical recycling. The recycling model

¹⁰² Mitsubishi Chemical Group. *Kaiteki 2022*. November 2022.

utilizes waste PMMA that is turned back into MMA monomers.¹⁰³ The design, once implemented, promises to reduce emissions and decrease fossil fuel and energy consumption.¹⁰⁴

After experiencing positive test results on experimental efforts, Mitsubishi has announced it is building an MMA production facility using plant-derived materials in India. Röhm has also launched a project to eliminate fossil fuels in the feedstock used in their MMA production process.¹⁰⁵

As the MMA market remains oversupplied, Mitsubishi and other leaders in the industry are orchestrating plans that could result in reduced emissions through use of biofuels.

The efforts to replace fossil fuels, however, are put at risk by other plans being carried out by the same companies to build new capacity using the three traditional pathways. New capacity buildout at this point using traditional pathways will add to the oversupply of the market and prolong reliance on fossil fuels. Such contradictory investments undermine the credibility of Mitsubishi's sustainability goals.

E. Export Markets Are Uncertain

U.S. MMA markets are moving from net importers to net exporters at a time of significant international realignments. New products produced by the Geismar facility would face stiff trade competition.

U.S. MMA producers face stiff competition from Middle East and northeast Asian MMA producers. The Geismar facility is entering the global market at a time of significant uncertainty. Current industry participants face a series of financial, political, and technological factors that are likely to disrupt new international partnerships.

The largest importer of MMA is China. It is also a significant exporter. Surplus U.S. production from Mitsubishi's proposed plant is unlikely to find an outlet in China. Mitsubishi recently closed its Hiroshima plant, citing oversupply in the region from China.¹⁰⁶

U.S. producer market share for MMA in Europe has been supported principally by Germany's petrochemical sector. A robust expansion of the MMA market in Europe is unlikely. How does the European economy realign as it adjusts to the Ukraine war? Will sustainability agreements reduce or replace demand for cyanide and ethylene-based MMA? If chemical recycling proves viable or bio-based feedstock applications gain traction, will the Geismar calculus suffer?

¹⁰³ A number of initiatives have been launched, including one by the [European Chemical Industry Council](#). The model is the result of a collaborative effort of several companies that have invested in the mechanical recycling, bio-plastics chemical and production processes.

¹⁰⁴ [Pilot Plant](#).

¹⁰⁵ Röhm. [OCI global and Röhm announce pioneering production of methyl methacrylate \(MMA\) using bio-ammonia](#). November 2023.

¹⁰⁶ Argus. [Japan's Mitsubishi Chemical to cut MMA, AN output](#). February 27, 2024.

U.S. producers have also benefited from sales to Saudi Arabia. Mitsubishi and Saudi Arabia Basic Industries Corporation (SABIC) have joint ownership of a 250,000 ton/year MMA facility in Jubail.¹⁰⁷ The facility was opened in 2018 and supports customers in Europe, Asia, and Africa. The story on MMA in Saudi Arabia is an export story, but level of support for imports is likely to continue.

U.S. producers have traditionally found customers in South Korea, Singapore, and Thailand. As China's petrochemical producers change direction, the evolution of these trade relations is uncertain. China may elect to focus on trade relations within the region as part of its own geopolitical realignment.¹⁰⁸ Even the currently stable relations for U.S. producers will require careful monitoring.

U.S. producer trade levels of MMA have been robust for many years. While demand is likely to increase within Europe, it is uncertain how the demand will be met, given the strong trade relations between European nations and Middle East and Chinese interests. Mitsubishi has recently closed its MMA plant in the UK, citing a highly competitive global market.¹⁰⁹

These constraining aspects on MMA trade are likely to be compounded by rising demand for "green" methyl methacrylate. Industry leaders, including Mitsubishi, are now moving from the experimentation/design phase into commercialized plant construction using bio feedstock.

Another factor adding to the uncertainty relates to the reshuffling of trade interests in the face of the ongoing, prolonged Ukraine-Russia war. Many European nations are realigning their investment strategies to address rising calls for greater national security in key supplies and production processes, a consideration with far-reaching implications for the structure of manufacturing in each country. Although it constitutes a small part of overall production and trade, it is uncertain how MMA trade shakes out during this period of realignment.¹¹⁰

¹⁰⁷ 2b1st Consulting. [Sabir and Mitsubishi to tender Jubail MMA—PMMA EPC Contract](#). July 5, 2013. Also see: Chemical Engineering. [Mitsubishi Chemical and Sabic start up joint production site in Saudi Arabia](#). April 4, 2018.

¹⁰⁸ ICIS. [The "National Champions" in the New Petrochemicals Landscape](#). November 2023.

¹⁰⁹ Chemweek, [Mitsubishi to close methyl methacrylate plant in UK](#). December 26, 2022.

¹¹⁰ European Commission. [First-ever European defence industrial strategy to enhance Europe's readiness and security](#). March 5, 2024.

F. Mitsubishi's Stakeholder Outreach Fails to Pass Muster in the Context of Corporate Sustainability and Human Rights Concerns

Mitsubishi has set out two critically important oversight pathways to assess and include the views of non-financial stakeholders in its corporate planning processes.

The first pathway relates to the company's sustainability outreach. Mitsubishi reports that it regularly meets with non-governmental organizations (NGOs) on matters of policy and individual fossil fuel projects. The company claims that it has benefited from valuable insights provided by NGOs as part of its engagements.¹¹¹

The second pathway relates to the company's human rights concerns. The company professes respect for basic human rights globally and subscribes to the international norms contained in such documents as the Universal Declaration of Human Rights. When the company is considering an investment, it conducts a "comprehensive screening process" that considers business and societal impacts (consistent with its human rights guidelines).¹¹²

In response to Louisiana Gov. John Bel Edwards's support of the plant, three community leaders wrote Dec. 22, 2020 letters to *The Advocate*, raising concerns about the proposed plant:

1. The lack of environmental review that surveyed the land and air issues;
2. Broader issues related to planning for a healthy community; and
3. A key social justice concern.

Local leaders have argued that the promise of jobs and prosperity rings hollow, given that the area is already heavily saturated with petrochemical plants but the people living in the community remain poor.¹¹³

A December 2020 letter to Mitsubishi published and signed by 19 NGOs representing community, climate and environmental interests echoed the same sentiments.¹¹⁴ Finally, organized community opposition expressed at the February 2024 Louisiana Department of Environmental Quality hearing on the Geismar project articulated the same concerns.¹¹⁵

¹¹¹ Mitsubishi Corporation. [Integrated Report 2023](#). March 31, 2023, p. 103.

¹¹² Mitsubishi Corporation, *op. cit.*, p. 104.

¹¹³ Greater New Orleans Interfaith Climate Coalition. [Three Letters](#). December 12, 2020.

¹¹⁴ Louisiana Bucket Brigade. [Letter to Mitsubishi](#). December 2020.

¹¹⁵ Louisiana Illuminator. [Environmental groups oppose \\$1 billion petrochemical plant in Geismar](#). February 3, 2024.

The community has voiced a long history of concern—so much so that President Biden in a speech in January made clear that Cancer Alley would receive attention from his administration.¹¹⁶ Despite the presidential acknowledgement, however, the matter of Cancer Alley remains unresolved.¹¹⁷

Most major companies like Mitsubishi acknowledge that climate change and the energy transition are shifting their financial priorities. Part of the change requires greater engagement not only with suppliers, bankers, and other stakeholders with direct financial interests, but also with leaders of affected communities. Mitsubishi, as noted above, has acknowledged in principle the need to address community and climate concerns articulated by non-profit institutions. Yet the company has not met with community leaders regarding the Geisner project.

One of the largest concerns of residents is the incidence of serious illnesses that are connected directly and indirectly with the levels of pollution from the heavy concentration of petrochemical facilities in the community. Low birth weight newborns, children and the elderly with asthma, and disproportionate levels of cancer at all ages are well-known problems. The lack of proper response within healthcare facilities and medical professionals who are committed to the community is well-known.¹¹⁸

Unwillingness to meet and discuss individual investments with affected communities goes to the heart of corporate credibility.

Mitsubishi's failure to address the issues leaves the company exposed to a highly divisive matter in the United States. The issue of racial injustice due to over-concentration of heavily polluting industrial facilities in communities with large numbers of African-Americans is a matter that Moody's has cited as a financial risk for companies doing business in America.¹¹⁹ The risk—particularly for global companies with home headquarters in other countries—can cause reputational damage.¹²⁰

¹¹⁶ NOLA.com. [Biden utters the words "Cancer Alley," but will he help Louisiana's chemical corridor?](#) January 28, 2121.

¹¹⁷ Bloomberg Law. [Biden Environmental Justice Goals Face Headwinds in Courtrooms](#). February 26, 2024.

¹¹⁸ NPR. [No reprieve for 'Cancer Alley': Louisiana pollution correlates with preterm births](#). March 18, 2024.

¹¹⁹ Moody's Investor Services. [United States Government: Racial disparities exemplify the long-standing and growing income and wealth inequalities that raise social risk](#). July 14, 2020. (Proprietary)

¹²⁰ Formosa, a Taiwan company with a poor environmental reputation faced negative press in its headquarters city because its Louisiana petrochemical project proved to be racially divisive. The company's entanglement in a highly charged United States domestic dispute represented an unanticipated cost to the company's reputation. Taipei Times. [Louisiana judge nixes US\\$9bn Formosa plant](#). September 2022.

Conclusion

The Louisiana Geismar project sponsored by Mitsubishi faces a cumulative set of financial risks that makes it unviable in IEEFA's view. Slower economic growth, weak project financing, disruptive trade realignments, market challenges, sustainability options and growing public opposition create a risk profile that offsets the benefits of low-cost natural gas. The risk profile is resulting in a shift in creditworthiness from decades of credit positives to red flag credit warnings pushing traditional petrochemical investments toward credit negatives. The warnings are shedding new light on the credit positive aspects of sustainable alternatives. Some alternatives point to potential solutions to climate and environmental problems and other solutions trade one problematic scenario for another. The Geismar project, relying on ethylene-based technology, would decrease the traditional toxic use of cyanide as feedstock, but it would increase harmful emissions of greenhouse gases.

Innovation designed to address the twin problems of environmental toxicity and greenhouse gas emissions are showing promise. Mitsubishi and other leaders in the field are moving forward with biofuel concepts that could prove useful. Given the existence of alternative pathways, Mitsubishi's unfulfilled pledge to work with communities to address sustainable community economic development and to combat historical racial and income injustices is in reach. The company should build on this opportunity, rather than pursue a project that has weak financial prospects and poses reputational risks.

Plastics and petrochemical facilities are trying to fill a profit void created by faltering oil and gas business lines now losing out to sustainability initiatives in the transportation, power generation and energy alternatives spaces. Yet petrochemical growth, particularly in the form of single-use plastics, is giving rise to toxic levels of chemicals in the oceans and the nation's waterways. Additional chemical growth, such as that of methyl methacrylate, the subject of this paper, has brought the issue of pollution to the air, water, and land of cities and towns. With the location of multiple petrochemical facilities in communities where high concentrations of African-Americans live, multi-layered environmental and climate issues now tear at the reputational credibility and creditworthiness of large global companies—including Mitsubishi.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

About the Author

Tom Sanzillo

Tom Sanzillo, director of financial analysis for IEEFA, is the author of numerous studies on the oil, gas, petrochemical and coal sectors in the U.S. and internationally, including company and credit analyses, facility development, oil and gas reserves, stock and commodity market analysis and public and private financial structures. Sanzillo has experience in public policy and has testified as an expert witness, taught energy industry finance and is quoted frequently in the media. He has 17 years of experience with the City and the State of New York in senior financial and policy management positions. As the first deputy comptroller for the State of New York Sanzillo oversaw the finances of 1,300 units of local government, the annual management of 44,000 government contracts, and over \$200 billion in state and local municipal bond programs as well as a \$156 billion global pension fund.

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