

# Formosa's Louisiana Project: Wrong Products, Wrong Time, Wrong Place, Wrong Finances

## *Plastics Market Oversupply and Legal Challenges Loom*

### Executive Summary

Financial, market, regulatory and political risks have combined to make Formosa Plastics' proposed petrochemical Sunshine Project unviable. The project, planned for St. James Parish, La., would begin operations at a time of market oversupply, low petrochemical prices, strong competition for market share, restrictive trade policies, environmental regulatory challenges, judicial findings of historic racial discrimination, popular opposition, rising construction costs and a weakened bond rating. Warnings of cancellations and delays of similar projects are occurring globally and signs of financial distress in the Louisiana petrochemical market are apparent.

Formosa Plastics is a financially strong company with a solid dividend history. IEEFA's projected balance sheet of the Louisiana project—low revenues, tight profit margins and poor returns—provides a warning sign that a final investment decision to move forward would cause Formosa to make the wrong products, at the wrong time, at the wrong price, in the wrong place and with the wrong financial calculus.

- From 2010 to 2016, global market conditions favored cracker investments, but the rush to build new cracker capacity created a global oversupply that has driven prices down. Prices for petrochemical products relevant to Formosa's project are rising but remain much lower today than during Formosa's planning phase and are unlikely to rise sufficiently by the time of commercial operation to produce healthy profit margins. Price competition can be expected to intensify and profitability can be expected to decrease as new capacity comes online through 2025. Standard & Poor's, Moody's and others cite weaknesses in the market. Shell's recent closure of its Louisiana refinery and Sasol's distressed sale of its new Lake Charles facility highlight local problems. IEEFA estimates that annual revenues will be in the \$2.5 billion range, 20 percent lower than predicted in a consultant study Formosa used in 2018.
- The virgin plastics market is unlikely to grow at a fast enough pace to absorb the oversupply. In a post-pandemic world, economic growth—which has historically driven plastics consumption—may not be sufficiently robust to absorb the oversupply. Also, recycling initiatives and bans on single-use plastic are likely to reduce traditional growth estimates for virgin plastics.

The combined impact of these factors will slow the rate of growth in the virgin plastics market as new cracker plants come online. Market imbalance is likely to persist, with low prices and diminished profitability.

- The export outlook from the United States is uncertain. China, which imports well over half of the ethylene, polyethylene and polypropylene on the global market, is adding substantial new cracker capacity within its borders. As China adds capacity, its import growth rate will decline and the demand for petrochemicals, particularly those shipped halfway around the world, will decrease.
- Rising construction costs will diminish the Formosa project's profitability and have contributed to a recent credit downgrade. The Taiwan Rating Service (TRS) recently estimated the cost of the project to be \$12 billion, a 24 percent increase from Formosa's original 2018 estimate of \$9.7 billion. TRS downgraded Formosa from AA to AA-, based in part on the project's impact on Formosa's cash flow. Rising commodity prices for iron ore, steel and copper may push construction costs higher.
- The Formosa project faces regulatory risks. Formosa management has acknowledged that it cannot build a new petrochemical plant in Taiwan due to government concerns over environmental impacts. The company has stated that Texas and Louisiana government officials are more cooperative. Yet in Louisiana, Formosa's local, state and federal permits face legal challenges from the community and public interest organizations. The U.S. Army Corps of Engineers, for example, is re-evaluating the project's water permit based on new information on alternatives. The Corps also faces a legal challenge for its failure to produce an environmental impact statement on the project. The extent to which these proceedings could derail the project or add to its costs is not yet known.
- Formosa decided to locate the plant in Louisiana's St. James Parish, where 91 percent of the population in the immediate district is African-American. The area is already so saturated with toxic and carcinogenic pollution from decades of industrial activity that it is widely known as Cancer Alley. President Joe Biden, in remarks on signing executive orders on environmental policy, cited Cancer Alley as one of the "hard-hit areas" of concern with regard to "the disproportionate health and environmental and economic impacts on communities of color." A Louisiana district court judge has expressed concern that the state's environmental agency should have analyzed concerns about environmental racism regarding the project.
- The project faces long-term political risks. Pollution and environmental racism are likely to remain persistent issues for Formosa regardless of the outcome of permit challenges. The project site contains old graves, likely those of slaves who once worked the plantation, adding a deeper layer of meaning to the community's connection to the land. A protracted dispute that is rooted in historical patterns of racial injustice would be polarizing.

This poses a challenge for the United States under a new administration as it sorts out its relationship with Taiwan going forward.

Formosa Plastics has stated that it will not make a final investment decision on the project until a coronavirus cure is found or a vaccine is distributed. Formosa should use the delay to reassess this ill-advised project, which should be abandoned given its weakened fundamentals.

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## Background

Formosa Plastics Group (FPG) is a Taiwanese conglomerate with a diverse set of interests in biotechnology, petrochemicals, and electronics. Headquartered in Taipei, it is a holding company for Formosa Plastics Corporation (FPC), Formosa Chemicals and Fiber, Formosa Petrochemicals and NanYa Plastics. FPG and its four subsidiaries, which are highly integrated, had annual revenues of \$6.8 billion in 2019. The four companies are traded on the Taiwan stock exchange (1301.TW). The companies are financially strong with a long history of meeting dividend targets. They are rated A3 by Moody's Investor Service and were recently downgraded by SP Taiwan Rating Service to AA-.<sup>1</sup> The company has production bases in Taiwan, the United States, China, Vietnam, the Philippines and Indonesia.<sup>2</sup>

**Formosa should use the delay to reassess this ill-advised project, which should be abandoned given its weakened fundamentals.**

The company produces many base chemicals, including ethylene, chlorine, propylene and caustic soda. It also produces intermediate chemicals, including ethylene dichloride, monoethylene glycol, terephthalic acid and vinyl chloride, as well as polymers, including polyvinyl chloride and high, low and low linear density polyethylene and polypropylene. (See [Appendix I.](#))

During 2019, the company's revenues of \$6.8 billion were generated from five primary sources:

- Plastics (34%)
- Polyolefin (21%)
- Polypropylene (18%)
- Tairyln (15%)
- Chemistry (10%)
- Others (2%)

Formosa has had business operations in the United States since the late 1980s. The hub of its industrial activity is in Port Comfort, Texas, where it has been active since 1983.<sup>3</sup> The company's presence in Port Comfort today consists of a recently

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<sup>1</sup> Moody's Investor Services. Formosa Plastics Corporation, Credit Opinion, Update. September 17, 2020 (available on request). Also see Taiwan Rating Service. [Ratings On Formosa Plastics Group Core Units Lowered To 'twAA-' On Growing Operating Headwinds; Outlook Stable](#). October 16, 2020, p. 2.

<sup>2</sup> See: [Formosa Plastics Corporation](#). Also see: [Sunshine Project](#).

<sup>3</sup> Formosa Plastics. [Our Operations – Port Comfort Texas](#).

expanded cracker and petrochemical complex.<sup>4</sup> The complex includes a 1.5 million metric tons per year (MMt/y) ethane cracker integrated with High Density Polyethylene (HDPE), Low Linear Density Polyethylene (LLDPE), and Ethylene Glycol (EG) capacity. It plans to add propylene (Propane Dehydrogenation, or PDH) and polypropylene (PP) capacity. Formosa also has operated a plant since 1993 in Baton Rouge, La., which can produce polyvinyl chloride and ethylene dichloride.

The company has equity interests in Nanya Technology Corp.; Nan Ya Printed Circuit Board Corp.; Formosa Sumco Technology; Formosa Taffeta; Formosa Plastics Corp., U.S.A.; Formosa Ha Tinh Steel Corp.; Formosa Resources Corp. and Mai-Liao Power Corp.

### *A. The Formosa Petrochemical Project Proposed for St. James Parish, La.*

In April 2018, Louisiana Gov. John Bel Edwards and the Formosa Group announced that Formosa Group LA LLC (FG LA LLC, a subsidiary of Formosa Plastics Group) planned to build a new petrochemical manufacturing complex in St. James Parish.<sup>5</sup> The multibillion-dollar complex would include two ethane crackers and processing capacity for high density polyethylene (HDPE), low linear density polypropylene (LLDPE), polypropylene (PP) resins, ethylene glycol (EG), and propane dehydrogenation (PDH) production. Formosa currently controls 6 percent of North America’s ethane cracker capacity. The project would increase the company’s cracker capacity and its polyethylene, ethylene glycol and polypropylene production capacity. It would also add capacity to produce propylene using propane dehydration.

**Table 1: Estimated Production Capacity of Formosa Project in St. James Parish<sup>6</sup>**

Metric Tons/Annual First Phase		Metric Tons/Annual Second Phase	
Ethane	1,200,000	Ethane	1,200,000
LLDPE	400,000	LLDPE	400,000
HDPE	400,000	HDPE	400,000
Ethylene Glycol (EG)	800,000	EG	800,000
Propane Dehydrogenation	600,000		
Polypropylene	600,000		

<sup>4</sup> The Port Comfort complex has capacity to handle naphtha, ethane, propane and butanol feedstock. It can produce polyethylene, polypropylene, ethylene glycol, ethylene oxide, ethylene dichloride, vinyl chloride and polyvinyl chloride.

<sup>5</sup> Office of the Governor. [Formosa Selects St. James Parish for \\$9.4 Billion Louisiana Project](#). April 23, 2018.

<sup>6</sup> James A. Richardson. An Economic Analysis of the Construction and Operation of a Major Manufacturing Facility by FG LA LLC in St. James Parish. April 2018, p. 164. (“Richardson Study”). This report was prepared for [Harris Deville and Associates](#), a government affairs company that handles issues management.

Project supporters predict that the petrochemical complex would create 8,000 temporary construction jobs and 1,200 permanent jobs, and provide additional tax revenues for St. James and four surrounding parishes.<sup>7</sup>

## *B. Strategic Significance of the Formosa Project for the Company*

The Formosa project would shift the company's enterprise-wide ethylene feedstock balance from a naphtha-based, Asia-centric operational mix to one that would be more evenly balanced by ethane-based North American investments. Currently, the global ethylene market is dominated by 67 percent naphtha and 16 percent ethane.<sup>8</sup> By 2025, the use of ethane as a feedstock is expected to rise to 23 percent globally.<sup>9</sup>

**Formosa has faced an increasingly difficult investment environment at home.**

Formosa has faced an increasingly difficult investment environment at home. Company management has acknowledged that Taiwan government officials have stigmatized the petrochemical industry in general and Formosa in particular over environmental concerns. It cannot build another facility in Taiwan.<sup>10</sup> The Vietnamese government fined the company for environmental violations at its steel facility, and local groups continue to campaign against the plant.<sup>11</sup> Formosa also faces ongoing citizen opposition in Taiwan over the environmental performance of the Formosa Plastic Corporation Naphtha Cracker No. 6.<sup>12,13</sup> Activists in Taiwan have urged the company to abandon the project in Louisiana.<sup>14</sup> Also, the recent trade tensions between the United States and China have had a negative impact on Formosa's China operations.<sup>15</sup>

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<sup>7</sup> *Ibid.* Also see: FG LA LLC. [Proposed Project](#). Retrieved February 10, 2021.

<sup>8</sup> IHS Markit. [Ethylene Market Outlook Considering the Impact of Covid-19](#). September 2020. Liquefied Petroleum Gas and others comprise the balance.

<sup>9</sup> *Ibid.*

<sup>10</sup> Bloomberg. [A Plastics Giant That Pollutes Too Much for Taiwan Is Turning to America](#). December 12, 2019.

<sup>11</sup> BizNews. [Formosa Pays \\$250 in Compensation to Vietnam](#). July 29, 2016. Also see: Focus Taiwan. [Groups again appeal for compensation in Vietnam pollution case](#). April 17, 2020.

<sup>12</sup> Business and Human Rights Resource Centre. [Groups march in Taiwan to protest air pollution; ask local govt. to stop issuing permits to a Formosa Plastics naphtha cracking plant](#). June 2017.

<sup>13</sup> China Perspectives. [Resisting Naphtha Crackers: A historical survey of environmental politics in Taiwan](#). Open Editions Journal. September 1, 2014.

<sup>14</sup> Earthworks. [Opponents of Formosa Plastics Louisiana Plant Petition Shareholders to Drop Project at Taiwan Annual Meeting](#). June 10, 2020. Also see: The World. [From Louisiana to Taiwan, environmental activists stand up to a major plastics company](#). July, 9, 2020.

<sup>15</sup> Nikkei Asian. [Trade War traps Taiwan between two superpowers](#). December 5, 2018.

### C. Status of the Formosa Project

Formosa initially floated the concept of a St. James project in 2015.<sup>16</sup> It bought land in 2016 and began acquiring permits and approvals. Formosa had originally planned to start construction in 2019 and finish the project in 2022.<sup>17</sup> The company subsequently split the construction plan into two phases, with construction on Phase One to begin in 2019 and finish in 2025, and Phase Two to be completed and operational by 2028.<sup>18</sup> The company has now delayed the project indefinitely, asserting that construction will not move forward until either a cure for the coronavirus is developed or a vaccine becomes widely available.<sup>19</sup> The project also recently experienced two setbacks regarding federal and state environmental permits.

On Nov. 10, 2020, the U.S. Army Corps of Engineers suspended the Clean Water Act permit, pending further analysis.<sup>20</sup> It had approved the permit in September 2019,<sup>21</sup> but local organizations challenged the decision in federal court. The Army Corps determined that a change in information on local air quality raised by the organizations could affect the analysis of alternatives to the project. As a result, it has launched a review of its previous analysis, which will include a new public comment period.<sup>22</sup>

On Nov. 18, 2020, Louisiana's 19<sup>th</sup> District Court Judge Trudy White, in response to a motion in an appeal of the project's air permit, ordered the Louisiana Department of

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<sup>16</sup> Plastics News. [Formosa Petrochemical considers new polyolefin plant in Louisiana](#). September 4, 2015. Also see: NOLA. [Bobby Jindal talks economic development, TPP with Taiwanese President Ma Ying-Jeou](#). January 14, 2014. In January 2014 then-Gov. Jindal traveled to Taiwan. Among his meetings was one with officials from Formosa to discuss the company's holdings in Louisiana and to discuss new investments. There was no mention of any specific projects during this 2014 account.

<sup>17</sup> Louisiana Economic Development, [Fast Lane Public Search, Advance Reports, FG LA LLC, \(ID # 20161542\)](#).

<sup>18</sup> Louisiana Economic Development, [Fast Lane Public Search, Board Approved ITEP Project Results, FG LA LLC, \(ID#20161542\)](#). The estimated total investment in the plant is listed as \$9.4 billion, with an estimated creation of 1,200 new jobs and 5,000 temporary construction jobs. The end date is listed as December 2028. Retrieved February 2, 2021.

<sup>19</sup> On October 20, 2020, Formosa informed the press that it would delay its final investment decision for the project until either a cure was found for the virus or a vaccine was made widely available. The Advocate. ['Major construction' of \\$9.4B Formosa plastics plant in St. James delayed until virus vax](#). October 20, 2020. The company restated this declaration on November 23, 2020. S&P Global. [Formosa Taiwan unit indefinitely delays \\$9.4 billion Louisiana petrochemical complex](#). November 23, 2020.

<sup>20</sup> Letter from Stephen Murphy, District Commander, Army Corps, to FG LA, LLC, re Notice of Suspension of Department of the Army Permit MVN-2018-00159-XM, November 10, 2020.

<sup>21</sup> U.S. Army Corps of Engineers. [Department of the Army Permit MVN-2018-00159-CM \(FG LA, LLC\)](#). November 1, 2018.

<sup>22</sup> Army Corps of Engineers, Federal Defendants' Motion to Stay Summary Judgment Briefing Pending Resolution of Motion for Voluntary Remand [Expedited Review Requested], in *Center for Biological Diversity, et al., v. U.S. Army Corps of Engineers, et al.*, Civil Case No. 1:20-cv-103-RDM, November 4, 2020.



Environmental Quality (LDEQ) to analyze environmental racism issues related to the permit, but was overturned at this stage. The appeal continues.<sup>23</sup>

The delays related to the coronavirus, regulatory permit reconsiderations and environmental justice issues have converged at a time when market forces have created a separate set of risks. This report explores those forces and presents the cumulative risks confronting the project.

### *D. Weak Financial Disclosure by Formosa Regarding Its Project*

Formosa has offered scant financial information to Louisiana residents about its proposed petrochemical complex in St. James Parish. In its permit filings, Formosa used a 2018 report from a consultant, James Richardson of Louisiana State University, to support its assertions of the project's economic impact.<sup>24</sup> It did not disclose any company-generated estimate of revenue. The consultant's study sets forth a revenue estimate that is an aggregate calculation; it provides no specific price information for the chemical and plastics products to be made at the complex.

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Although consistency varies among projects, sponsors of other petrochemical projects in the United States have been more transparent, disclosing information such as expected net revenues (margins),<sup>25</sup> expected rates of return,<sup>26</sup> costs of operation, ongoing capital outlays,<sup>27</sup> construction costs,<sup>28</sup> and historical price and margin data.<sup>29</sup>

A more robust set of publicly disclosed, project-specific financial information on the Formosa project would have been helpful to the researchers who prepared this report. IEEFA has relied upon current and future price, cost and volume data for ethane, ethylene, HDPE, LLDPE, ethylene glycol and propylene (propane dehydrogenation),<sup>30</sup> independent cost of operations and margin data from company

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<sup>23</sup> Order granting writ, *Rise St. James, et al., v. Louisiana Dept. of Environmental Quality*, No. 2021 CW 0032 (L. App. 1st Cir., March 15, 2021). Also see: The Advocate. [Appeals court says Baton Rouge judge prematurely ordered new analysis of Formosa plan](#). March 15, 2021.

<sup>24</sup> Richardson, *op. cit.*

<sup>25</sup> IHS Markit. [Benefits, Risks, and Estimated Project Cash Flows: Ethylene Project Located in the Shale Crescent USA versus the US Gulf Coast Executive Summary](#). March 2018.

<sup>26</sup> See: Sasol. [Lake Charles Chemicals Project—Fact Sheet](#). February 2019.

<sup>27</sup> PTTGC. [PTTGC 2019 Annual Report](#). March 6, 2020.

<sup>28</sup> Reuters. [Indicative Costs of U.S. Ethylene Projects, 2019-2020](#). June 11, 2020.

<sup>29</sup> IHS Markit. [Prospects to Enhance Pennsylvania's Opportunities in Petrochemical Manufacturing](#). March 2017.

<sup>30</sup> Sources include IHS Markit, ICIS, Plastics News, Plastics Exchange, Argus, and American Chemical Council.

filings,<sup>31</sup> and independent market analysts and professional construction cost estimates.<sup>32</sup> IEEFA has supplemented this information with disclosures contained in formal filings in regulatory and judicial proceedings, and with trade association and government publications. This information forms the specific building blocks that IEEFA uses to fill in the blanks left by the lack of formal information provided by Formosa.

Based on available public data, proprietary data secured by IEEFA, and IEEFA's independent analysis, we conclude that the St. James project is unlikely to meet its revenue targets; will experience an impaired rate of return from rising construction costs; will confront low operating margins during at least the first five years of operation under Phase One; and will face continued public questioning related to environmental effects, including the impacts of environmental racism.

## I. Why the Formosa Project Would Be Financially Risky From the Start

### *A. Plastics Prices Were High During the Project's Planning Process but Have Declined Substantially Since Then—and the Margins Are Tighter*

Large petrochemical facilities take years to develop and build. The outlook for a proposed plant can rise or fall as new events and trends drive markets. Many new cracker projects were planned between 2012 and 2015, when prices were relatively higher (\$1,250 to \$1,750 per metric ton) in the downstream plastics market ([Appendix II](#)). Some analysts in 2016 pointed to robust margins in ethylene (\$400 to \$800 per metric ton) and HDPE (\$200 to \$800 per metric ton) worldwide as strong evidence for a new wave of construction.<sup>33</sup>

The initial announcement of interest in the Formosa project in 2015 came against a backdrop of worldwide announcements of cracker build-outs (see [Figure 1](#)).<sup>34</sup> The total impact of these proposals, including the Formosa project, was predicted to increase global ethylene production capacity by 50 percent.<sup>35</sup>

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<sup>31</sup> Shell. [Shell 2019 Form 20 F](#). May 19, 2020, p. 17.

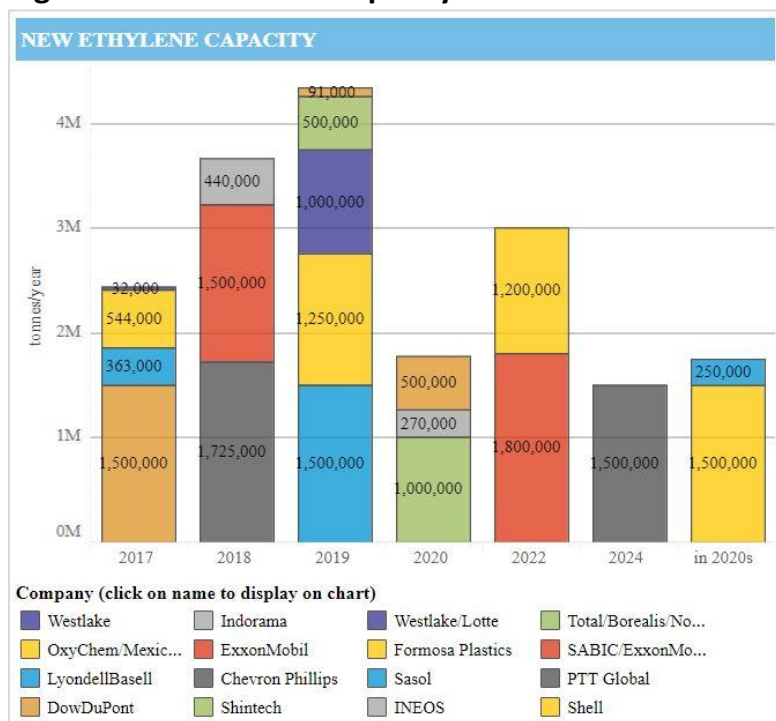
<sup>32</sup> Petrochemical Update. [U.S. Ethylene Complex Construction Costs Data 2018-2020](#). January 2018. Also see: Reuters. [Indicative Costs of U.S. Ethylene Projects, 2019-2020](#). June 11, 2020.

<sup>33</sup> IHS Markit. [Asia Chemical Conference: Ethylene - Global](#). November 2016, pp. 23-24.

<sup>34</sup> Area Development. [Plastics Industry Flourishes in Response to Market Demand](#). Q3 2018.

<sup>35</sup> Chemical and Engineering News. [Petrochemical makers look ahead to an uncertain decade](#). March 16, 2020.

Figure 1: New Cracker Capacity Planned and Added Since 2017<sup>36</sup>



Source: ICIS

But the prices for polyethylene (LLDPE, HDPE and LDPE) have declined substantially during the period from 2012 through the present ([Appendix II](#)). Despite recent price increases and volatility in the second half of 2020 and early 2021, polyethylene prices are higher but uncertainty remains concerning the size of the upward trajectory and the scenario going forward. Similar downward pricing pressures drive the ethylene glycol market.<sup>37</sup>

<sup>36</sup> ICIS. [US ethylene prices under pressure as supply builds, costs low](#). July 30, 2019.

<sup>37</sup> EChem. [Ethylene Glycol Price Analysis](#). June 2019. Also see: ICIS. [Margin squeeze hits some Asia petrochemical makers on naphtha, C2 spikes](#). June 17, 2020.

Figure 2: Pricing History, HDPE Injection GP, 1997-2021<sup>38</sup>



Source: *Plastics News, Commodity Thermoplastics, Historical Pricing HDPE GP Injection*, last checked March 15, 2021.

In 2019,<sup>39</sup> industry analysts began to highlight that the planned expansions would contribute to an oversupply of petrochemical products, and with it, a downward spiral in plastic prices and tighter margins.<sup>40</sup> The concern is that the economy's annual growth rate may not be sufficiently robust to absorb the oversupply at a rate that would sustain newly constructed cracker plants. Long-term scenarios for low oil prices, in addition, contributed to the bearish sentiment for U.S. crackers. Falling naphtha (oil) prices undermined the ethane (gas) cost advantage that had driven many of the U.S.-based new investment decisions.

Earlier in 2020, and prior to the pandemic's full outbreak, both IHS Markit Ltd. (IHS) and Independent Commodity Intelligence Services (ICIS) had observed that some of the existing pipeline and international cracker build-outs would be delayed or cancelled due to an oversupplied market for plastics.<sup>41,42</sup> ICIS identified Formosa's proposed St. James project as one that might be delayed or cancelled due to oversupply concerns.<sup>43</sup>

<sup>38</sup> *Plastics News, Commodity Thermoplastics, Historical Pricing HDPE GP Injection*, last checked March 1, 2021 (proprietary license).

<sup>39</sup> IHS Markit. [North American Petrochemical Competitiveness](#). 2017. In 2013 and 2016, IHS Markit presented the basic market scenarios that favored expansion. In 2013 and 2016, each presentation also contained a short risk analysis on the tendency to overbuild and for high margins to drop.

<sup>40</sup> ICIS. [Global cracker margins under siege](#). February 21, 2019.

<sup>41</sup> Inside Climate News. [Market headwinds buffet Appalachia's future as a center for petrochemicals](#). March 21, 2020.

<sup>42</sup> ICIS. [Poor margins to persist in 2020 amid collapse in demand and rising capacities](#). June 10, 2020.

<sup>43</sup> Shale Directories. [Market Conditions Threaten U.S. Petchem Projects](#). March 25, 2020. Also: IHS Markit had included the project on a list of ethylene crackers that are in the "headlines" but for

Today, profit margins along the ethane-to-petrochemical product chain are unsteady. IEEFA expects ethylene prices to rise over the next three years,<sup>44</sup> placing upward pressure on polyethylene, polypropylene and ethylene glycol prices. Profit margins will remain tight for the principal products that would be produced by Formosa's St. James petrochemical project, leading up to and including initial years of operation (even as rising oil prices push up naptha-based ethylene).

The company faces a long-term forecast of low prices for the products that its petrochemical project would produce. IEEFA expects some price volatility to occur related to short-term pressures caused by the pandemic and Gulf Coast climate events (severe storms disrupting industry operations). It is unlikely that these prices will increase in size and remain sufficiently robust to support a positive investment outlook. Overall, IEEFA assumes that the added cracker capacity expected globally over the next three years will keep downward pressure on prices. Also, price volatility in polyethylene and polypropylene markets creates the risk of market forces acting to destroy demand if prices rise too high, too fast.<sup>45</sup>

**Overall, IEEFA assumes that the added cracker capacity expected globally over the next three years will keep downward pressure on prices.**

### *B. Revenues Generated From Phase One of the Project Are Likely To Be Nearly 20 Percent Lower Than Previously Predicted*

IEEFA estimates that the revenues generated from Phase One construction will be \$2.5 billion, not the \$3.1 billion that the Richardson study used by Formosa had predicted. (See [Table 2](#).)

IEEFA's revenue estimate is drawn from a review of the price patterns for each of the specific products that will be manufactured. The most important variables affecting price are global oversupply, slow economic growth and tough competition from other producers. IEEFA estimates the petrochemical complex will face rising ethylene prices during the first five years of operation, which will result in tighter profit margins for the integrated operation.

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which insufficient ethane supply in the United States would be available. See: IHS Markit. [North American Petrochemical Competitiveness](#). October 2017, p. 19.

<sup>44</sup> Some shorter-term analyses see rising prices as well. See: IHS Markit. [U.S. ethane price to rise in 2021 on declining availability, rising demand](#). June 25, 2020.

<sup>45</sup> [Plastics News. Price hikes bring unpleasant surprise to resin markets](#). January 11, 2020 (proprietary license).

**Table 2: IEEFA Estimated Revenues for Phase One Operations First Year of Operation 2026<sup>46</sup>**

	Metric Tons	IEEFA Estimate 2026 \$/Metric Ton	Total
LLDPE	400,000	1,300	520,000,000
HDPE	400,000	1,180	472,000,000
Ethylene Glycol	800,000	650	520,000,000
Propane Dehydrogenation	600,000	1,017	610,200,000
Polypropylene	600,000	1,398	838,800,000
Total			2,961,000,000
Capacity 85%			2,516,850,000

Source: IEEFA.

### *C. Construction Costs Are Likely To Be Substantially Higher Than Formosa Estimated and the Project Less Profitable*

The company has stated that the plant will cost \$9.4 billion, including both Phase One and Phase Two.<sup>47</sup> Richardson’s study uses the same construction cost estimate. Recently, the Taiwan Rating Service estimated that the plant would cost \$12 billion. In response to a press inquiry from *The Advocate* (a Louisiana news organization), Formosa acknowledged rising construction costs but did not specify the amount. It reserved the right to adjust the project’s construction cost in the future.<sup>48</sup> IEEFA uses the Taiwan Rating Service recent estimate of a full project cost of \$12 billion, and adjusts the construction cost based on the construction timeline set forth in Richardson’s study.<sup>49</sup>

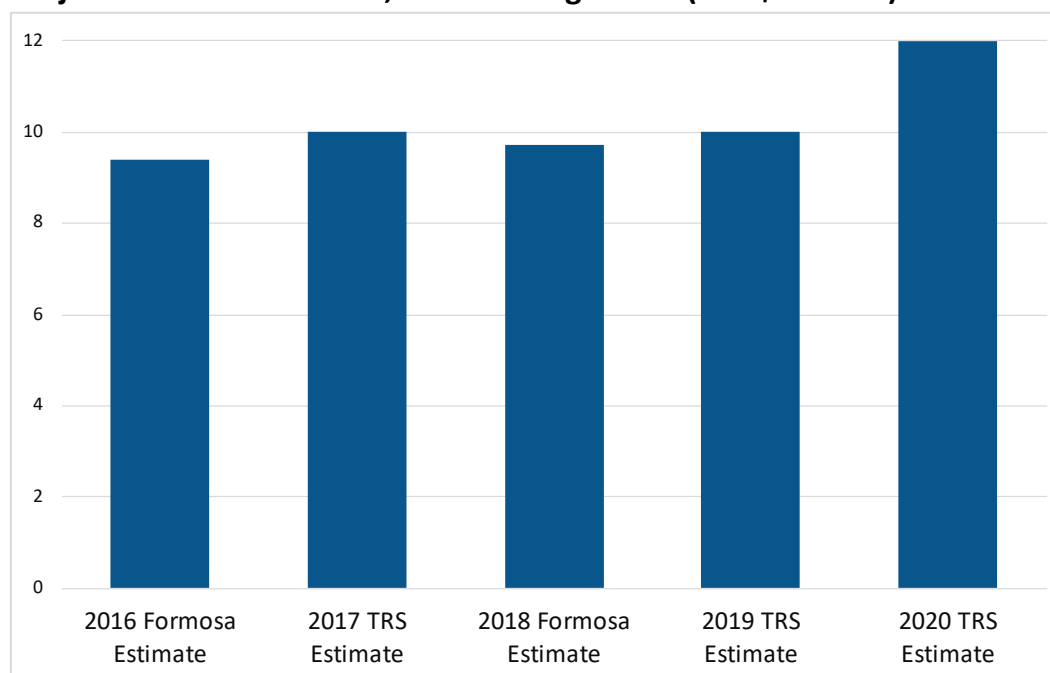
<sup>46</sup> Production, sales, price current data and future estimates drawn from IHS Markit, Plastics News, Plastics Exchange, ICIS, United States Energy Information Administration, International Energy Agency, ExxonMobil Investor Day, and American Chemistry Council.

<sup>47</sup> Office of the Governor. [Formosa selects St. James Parish for \\$9.4 Billion Louisiana Project](#). April 23, 2018.

<sup>48</sup> *The Advocate*. [Major Formosa plastics plant in St. James may cost \\$12 billion, rating agency estimates](#). December 15, 2020.

<sup>49</sup> Richardson, *op. cit.*, p. 8.

**Figure 3: Estimated Construction Cost of Formosa's Petrochemical Project in St. James Parish, 2016 Through 2020 (USD\$ Billions)**



Source: IEEFA.

In 2016, Formosa filed the \$9.4 billion estimate with the Louisiana Economic Development department.<sup>50</sup> In October 2019, TRS projected a construction cost of more than \$10 billion, including potential cost overruns, but the ratings service increased its construction cost estimate in October 2020 to more than \$12 billion.<sup>51</sup>

On Dec. 15, 2020, The Advocate reported that TRS had raised the construction cost estimate for the project to more than \$12 billion. The company responded:

"The difficulty of evaluating construction costs is attributable to skyrocketing costs stemming from uncertainties related to the pandemic, which attributed to FG's (Formosa's) deferral of major construction until the pandemic has subsided and/or vaccine has proven working. FG is monitoring all relevant factors closely, and may adjust the total projected Sunshine Project cost when the uncertainties can be resolved accordingly in (the) future."<sup>52</sup>

Any upward adjustment in the construction price is likely to be accompanied by a disclosure related to the decline in the project's rate of return. The concern over skyrocketing costs stems in part from the rapid price increases currently occurring

<sup>50</sup> Louisiana Economic Development. [Fast Lane Public Search, Advance Reports, FG LA LLC, \(ID # 20161542\)](#). Retrieved February 1, 2021.

<sup>51</sup> Taiwan Rating Service. [Ratings On Formosa Plastics Group Core Units Lowered To 'twAA-' On Growing Operating Headwinds; Outlook Stable](#). October 2020.

<sup>52</sup> The Advocate. [Major Formosa plastics plant in St. James may cost \\$12 billion, rating agency estimates](#). December 15, 2020.

in core commodities used in the construction process. These basic commodities—steel,<sup>53</sup> iron ore,<sup>54</sup> and copper<sup>55</sup>—have all experienced significant price spikes, and the increases are likely to continue.<sup>56</sup>

Sasol's recently completed cracker facility in Lake Charles, La., provides a cautionary example. Sasol, a South African competitor of Formosa's, encountered inflationary pressure and mismanagement problems that increased the facility's construction price. The increased costs led to deterioration in project finance and caused Sasol to reassess the expected internal rate of return (IRR) once the complex became operational. The project had been established with a return rate of 10.4 percent and a projected construction cost of \$8.1 billion.<sup>57,58</sup> By August 2016, the rate was adjusted to 8 percent, and the analysis accompanying the adjustment informed investors that for every \$500 million spent above \$11 billion, the IRR would drop by 0.3 percent. By May 2019, management announced a construction cost increase to \$12.9 billion.<sup>59</sup> Sasol further revised the IRR to between 6.0 percent and 6.5 percent. The construction cost problem was also compounded by negative changes in the short- and medium-term pricing outlook for the plant's products, including ethylene (ethane-based), LLDPE, LDPE, and ethylene glycol.<sup>60</sup> As a result of the controversy created by these events, shareholders launched a class-action suit against Sasol.<sup>61</sup>

The rise in construction costs for the Formosa project will not be offset by improved revenue estimates. IEEFA identifies several conditions that will likely make the project's profitability disappointing in the short run. Long-term trends make the project's profitability even more questionable.

#### *D. The Price of Ethylene as Feedstock May Rise, Posing Margin Risk*

The cost of ethylene, as feedstock, is the principal driver of expenses for production at the proposed project, accounting for approximately 60 percent to 70 percent of petrochemical production expenditures.<sup>62</sup> The price of ethylene (both naphtha- and ethane-based) consequently dominates the discussion of the profitability of petrochemical trading, the market allocation of plastic resins by feedstock source and longer-term projections of investment viability in new cracker facilities. In a low oil price environment, the market dynamic that creates the conditions conducive to investment (the "sweet spot") requires relatively low but rising ethylene prices

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<sup>53</sup> Trading Economics. [Steel](#). Retrieved January 21, 2021

<sup>54</sup> St. Louis Federal Reserve Bank. [Global Price of Iron Ore](#). Retrieved January 21, 2021.

<sup>55</sup> Macrotrends. [Copper Prices](#). Retrieved January 21, 2021.

<sup>56</sup> MarketWatch. [Here's what's in store for industrial metals, after the 2020 rally for steel, iron ore and copper](#). January 8, 2021.

<sup>57</sup> Sasol. [Investor Fact Sheet—Lake Charles Project](#). August 2016, p. 13.

<sup>58</sup> Sasol. [Sasol announces final investment decision on world-scale ethane cracker and derivatives complex in Louisiana](#). PR Newswire. October 27, 2014.

<sup>59</sup> Sasol. [Update on the Lake Charles Chemicals Project \("LCCP"\)](#). May 2019.

<sup>60</sup> Sasol. [Value Through Focus and Discipline](#). February 8, 2019, p. 2.

<sup>61</sup> BusinessLive. [Sasol's time to face the music](#). October 22, 2020.

<sup>62</sup> Penn State University. [How plastic is made from natural gas](#). January 17, 2017.



combined with economic growth that is robust enough to support rising prices in the petrochemical market (*e.g.*, HDPE, LLDPE, LDPE, PP, EG).<sup>63</sup>

Since 2012,<sup>64</sup> the price of ethylene in the United States has been low due to an oversupply of ethane. The ethane oversupply is driven by the use of hydrofracking, or unconventional drilling, an industry innovation that allows producers to access oil and gas from reserves previously not thought to be technologically or financially extractable. The new technique allowed U.S. oil and gas producers to accelerate their output dramatically, and the oversupply pushed ethane prices down in the United States.<sup>65</sup>

The ethylene market is oversupplied, and has supported prices in the 20 cents per pound (\$435 per metric ton) range.<sup>66</sup> For the past several years, plastics prices remained low as well, in the 40 cents to 60 cents per pound range (\$882 to \$1,300 per metric ton).<sup>67</sup> With low ethylene prices, low plastic prices can still support reasonable profit margins for polyethylene production (LLDPE, HDPE and LDPE). If polyethylene prices drop too far, however, then plastics margins shrink at those manufacturing plants that produce it.<sup>68</sup> When polyethylene prices remain low, investment in plastics is reduced, creating less demand for ethylene feedstock, which places further downward pressure on ethylene prices.<sup>69</sup>

**Profitability along the economic chain is sensitive to price and cost fluctuations.**

The scenario of low ethylene prices, however, can change. Low ethylene prices can only be sustained if the prices for oil (naphtha) and natural gas liquids (ethane) remain low. Recent markets, with oil prices in the high \$40 to low \$50 per barrel and natural gas prices below \$3 per million British thermal units (MMBtu), were

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<sup>63</sup> IHS Markit. [U.S. Ethylene prices in Q2 2019: Where have all the traders gone](#). July 1, 2019.

<sup>64</sup> For a detailed history of the origins and early history of fracking see: Daniel Yergin. [The New Map](#). New York, Penguin Press, 2020, Chapters 1-8.

<sup>65</sup> By 2018, the United States had become the largest global crude oil producer in the world. Energy Information Administration. [The U.S. is now the largest global crude oil producer](#). September 12, 2018.

<sup>66</sup> IHS Markit. [Ethylene and propylene prices in 2020: Two Market Stories](#). April 6, 2020.

<sup>67</sup> Chemical and Engineering Notes. [Petrochemical makers look ahead to an uncertain decade](#). March 16, 2020.

<sup>68</sup> ICIS. [U.S. PE Margins remain pressured amid ongoing supply additions](#). January 21, 2020.

<sup>69</sup> For examples of this market dynamic see IHS Markit. [Asia Chemical Conference: Ethylene - Global](#), *op. cit.*, pp. 19-24.

unsustainably low for oil and gas producers. Some analysts see rising ethylene prices through 2025 and beyond, driven by oil and gas price increases.<sup>70</sup>

Profitability along the economic chain—from natural gas extraction, to ethane and ethylene production, to raw plastics and petrochemical finished products—is sensitive to price and cost fluctuations at each point. If ethylene prices rise because of increasing ethane costs and the price for polyethylene remains the same, then polyethylene profit margins are lower for a project like Formosa (see [Table 3](#)).

**Table 3: Illustration of Impact of Rising Feedstock (Ethylene) Prices on Polyethylene (PE) Margins (All Prices per Metric Ton)<sup>71</sup>**

PE PRODUCT	2020	2025
Price (\$/Ton)	1,003	1,180
Feedstock Costs (Ethylene)	(435)	(747)
All In Costs	(187)	(260)
Margin	381	173
Depreciation	(149)	(137)
Net Margin	232	36

Source: IEEFA.

Table 3 demonstrates that when ethylene prices rise precipitously, margins for polyethylene decrease. The table shows that the margins decrease even when polyethylene prices have experienced a modest increase. This market scenario is particularly relevant for the Formosa project. With the recent announcement of an indefinite delay, it is unlikely that the petrochemical complex could be built and opened before mid-2025 or 2026. If ethylene prices rise, plastic margins will be pressured. Price increases of petrochemicals and plastics products may reach limits and face a period of demand destruction.

The facts strongly suggest that the Formosa project faces a lengthy period of financial uncertainty and stress. ICIS and IHS each issued cautionary assessments of projects that have been announced but are not yet in construction, largely based on concerns of oversupply.<sup>72,73</sup> The warnings were issued before the pandemic. IEEFA concludes that the substantial disruption caused by the pandemic compounds the earlier caution.

<sup>70</sup> Strata Advisors. [North America’s Long-Term Steam Cracker Margin Outlook](#). December 17, 2019. Also see: 1012 Industry Report. [Saturation Point: What do low prices mean for ethylene and LNG projects planned for south Louisiana](#). April 13, 2020.

<sup>71</sup> This illustration identifies a generic PE price/margin model and varies the costs by assuming ethylene costs are rising due to market forces. The illustration includes depreciation and assumes a straight ten-year depreciation amortization schedule. While some models do not include depreciation, return or debt impacts, IEEFA includes them here because in a time of tight margins, rising construction costs and higher debt levels, enhanced diligence is required.

<sup>72</sup> ICIS. [Global chemicals must prepare for extended economic downturn, lower-for-longer oil](#). March 31, 2020.

<sup>73</sup> Inside Climate News. [Market Headwinds Buffet Appalachia’s Future as a Center for Petrochemicals](#). March 21, 2020.

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## II. Why the Situation Is Not Likely To Improve: Substantial Long-Term Risks To Operational and Financial Success

The cumulative impact of market forces along the ethane-to-petrochemical chain makes the project financially unviable not only in the short term, but also in the long term. The low ethane-to-ethylene prices that once gave U.S. production a petrochemical price advantage have eroded.<sup>74</sup> Other factors, such as weak economic growth, rising capital costs, competition among producers, fracking industry stresses, early warnings from bond raters, severe pollution issues and the project's association with a long history of racial discrimination collide on Formosa's balance sheet, making the investment decision problematic.

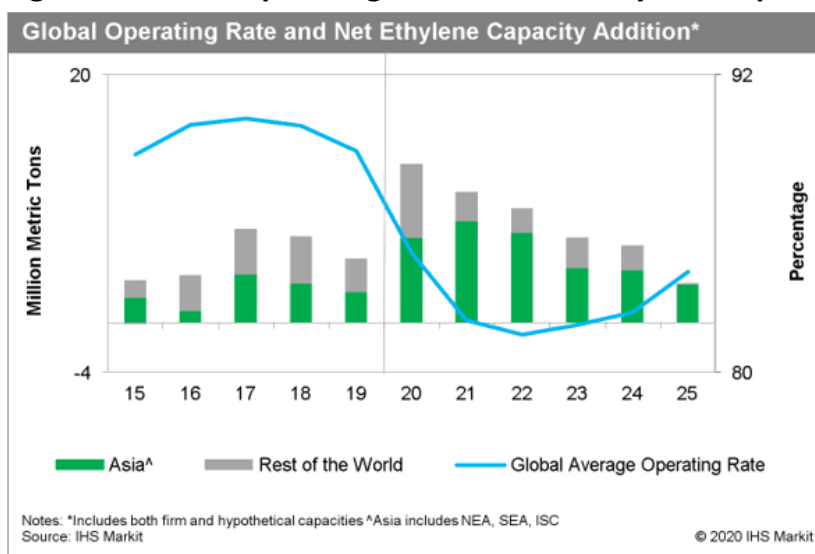
### *A. The Economy Will Be Slow To Absorb Oversupply of Existing Capacity*

Formosa faces low prices and profits when the project opens for the initial operating period. IHS Markit estimates that worldwide operating rates for ethylene plants will drop from the high 80 percent range in 2019 to the low 80 percent range by 2022, then rebound to 84 percent by 2025 (See [Figure 4](#)). Prices and profit margins are likely to improve but remain low. Ethylene capacity will expand as new ethane crackers enter the market. Operating rates will decline as demand for ethylene is slow to absorb the added cracker capacity. As new surplus cracker capacity is eventually absorbed due to expected demand increases from plastics manufacturers, cracker operating rates are likely to rise by the end of the decade.

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<sup>74</sup> ICIS. [Era of cost-advantaged ethane crackers ends \(podcast\)](#). April 14, 2020.

**Figure 4: Global Operating Rate and Net Ethylene Capacity Additions<sup>75</sup>**



The first phase of the Formosa plant could become operational in mid- to late 2025, with an 84 percent estimated ethylene operating rate. Thus, the market environment leading up to the Formosa project's operational date (2024-26) will be one of oversupply, low prices and depressed profit margins.<sup>76</sup> Similarly, the polyethylene market is facing a period of oversupply in the United States that is placing downward pressure on polyethylene sales.<sup>77</sup>

The rate of absorption of this new capacity in the years leading up to and following the operational date of the Formosa project are uncertain. The impact of the pandemic and recent weather events has created crosswinds for the petrochemical industry. On the one hand, increased use of plastic products that support the health sector pushes up demand and prices, and improves the potential for investment. On the other hand, generalized economic uncertainty is pervasive and the recovery is very difficult to predict.

### *B. China, the World's Largest Importer of Petrochemicals, Is Increasing Domestic Capacity. Will the Growth Rate of Dependence on Outside Supply Sources Decrease?*

China is currently the world's largest importer of ethylene, polyethylene and polypropylene. China has embarked on a large-scale project to increase the number of crackers built domestically. The new domestic capacity will decrease the growth

<sup>75</sup> IHS Markit. [Ethylene Market Outlook Considering the Impact of Covid-19](#). September 10, 2020.

<sup>76</sup> See discussion of long-term slowdown in Chinese economy and impact of competition: ICIS.

[Asian PE and PP margins at lowest levels for at least five years and will go lower](#). December 2019.

<sup>77</sup> IHS Markit. [The Near-Term Reduction of the North American Advantage for Polyethylene](#). May 27, 2020. Monoethylene glycol and polypropylene each also faced oversupply issues in 2020. See: ICIS. [Global Chemicals Outlook 2020](#).

rate of imported petrochemical resins over the next decade.<sup>78</sup> China's recent regional trade pact will also have a significant impact as it gives China's neighbors an advantage on petrochemical import and export transactions.<sup>79</sup> Ethylene importers are already feeling the pressure from China's expanded competition.<sup>80</sup> It is unlikely that demand in other parts of the global market will compensate for the demand that is lost by China's increased domestic capacity.<sup>81</sup> The net effect will be a tighter global market for new entrants circa 2025-26.

### *C. Competition Among Producers Places Downward Pressure on Plastics Pricing*

If built, the proposed Formosa petrochemical project would enter the market when competition among producer companies will be stiff. Added to its investments in the Point Comfort facility in Texas, Formosa's petrochemical project in St. James Parish would aggressively increase the company's position in the ethylene, polyethylene, ethylene glycol, polypropylene and propane dehydrogenation markets in the United States. Formosa's competition in the polyethylene and polypropylene markets alone, for example, consists of at least 12 large international competitors. Those competitors include ExxonMobil, Chevron Phillips, Dow Chemical, LyondellBasell, Sasol, Braskem, Total, INEOS and others.<sup>82</sup> Each company faces severe financial problems over the next few years. As new integrated facilities open, market forces are likely to keep pressure on ethylene producers to reduce costs and plastics producers to maintain low prices.<sup>83</sup>

**The Louisiana economy is already experiencing signs of declining profitability and weak asset valuations in the oil and gas market.**

The Louisiana economy is already experiencing signs of declining profitability and weak asset valuations in the oil and gas market. In November, Shell announced it would close its Convent refinery located in St. James and Ascension parishes. The refinery, in business under various ownership structures since 1967, can refine 240,000 barrels per day of crude oil. The refinery produces regular gasoline,

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<sup>78</sup> ICIS. [China Aims End Petrochemical Imports](#). April 29, 2018. See also: ICIS. [Long term downcycle will transform global petrochemicals, creating new winners and losers](#). December 6, 2019.

<sup>79</sup> ICIS. [Asia petrochemical trades to get strong long term boost from RCEP](#). November 20, 2020.

<sup>80</sup> ICIS. [China's need for ethylene could contract in 2020](#). May 7, 2019.

<sup>81</sup> Platts. [US Chemical Industry: Caught in US-China Trade War. Petrochemicals Special Report](#). October 2018.

<sup>82</sup> American Chemistry Council. [The Resin Review: 2020](#). May 2020.

<sup>83</sup> Chemorbis. [SEA-PE market remains under pressure from flood of competitive U.S. offers](#). August 19, 2019.

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aviation fuel, diesel and heating oil, propane, butane, No. 6 oil and refinery-grade sulfur.<sup>84</sup> The refinery that employs 1,100 workers was shut down as part of Shell's longer-term strategy to move away from oil, in response to weak finances in recent years, due to the inability to find a buyer, and ultimately triggered by the demand and price collapse brought on by the pandemic.<sup>85</sup>

Further evidence of market distress emerged as Sasol completed the construction of its troubled Lake Charles facility. The petrochemical complex completed construction considerably over budget at a final cost of \$13 billion.<sup>86</sup> In October 2020, Sasol and LyondellBasell announced the formation of a joint venture. LyondellBasell obtained a 50 percent share of the complex for \$2 billion.<sup>87</sup> Sasol has retained responsibility for the \$10 billion debt obligation incurred for the construction.<sup>88</sup>

LyondellBasell effectively paid 15 percent of the plant production cost to gain a 50 percent share of the venture. Moody's downgraded LyondellBasell despite the low price ("attractive valuation that is meaningfully below replacement cost") paid for the 50 percent interest.

"Despite a very attractive valuation that is meaningfully below replacement cost, Lyondell's credit metrics are expected to be very weak for the prior Baa1 rating through 2022," said John Rogers, senior vice president and lead analyst at Moody's Investor Service." Additionally, given global capacity additions and weak oil prices over the next year or two, we expect that Lyondell will have difficulty generating meaningful free cash flow and reducing debt, despite the three months of U.S. polyethylene price increases in the third quarter of 2020."<sup>89</sup>

Moody's downgrade speaks to the current weak polyethylene prices, low oil prices and general oversupply of the market as primary factors in their decision. It also speaks to the distressed sale price that Sasol accepted to attract a partner to share the risks.

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<sup>84</sup> Shell. [Convent Refinery](#). Retrieved January 29, 2021.

<sup>85</sup> Nola.com. [Shell is closing its Convent refinery; what does this mean for clean energy in Louisiana?](#) November 14, 2020.

<sup>86</sup> Bloomberg. [Sasol's \\$13 Billion U.S. Blunder Costs Co-CEOs Their Jobs](#). October 28, 2019.

<sup>87</sup> LyondellBasell Industries, Inc. [Form 8-K, Exhibit 99.1](#). October 1, 2020, pp. 106-109.

<sup>88</sup> The Advocate. [Houston petrochemical player to operate some of Sasol's Lake Charles site after \\$2B deal](#). December 2, 2020.

<sup>89</sup> Moody's. [Moody's downgrades LyondellBasell's ratings to Baa2, outlook stable, after Sasol joint venture announcement](#). October 5, 2020.

## *D. Weather Events Have Increased in Frequency, Size and Intensity on the Gulf Coast, Causing Outages, Price Spikes and Other Disruptive Impacts*

The Formosa project is located in an area that the federal government has identified as facing high risks from weather events.<sup>90</sup> Gulf Coast petrochemical plants have experienced substantial damage from hurricanes that are occurring with greater frequency and intensity between the Florida Panhandle and Texas. The U.S. Department of Energy reported:

“As discussed ... 95 percent of U.S. ethylene production capacity currently exists in Louisiana and Texas. This concentration of assets and operations may pose a strategic risk to the U.S. economy moving forward as extreme weather events impacting petrochemical and plastics production on the Gulf Coast can limit the availability of feedstocks to manufacturers across the United States. To give a recent extreme weather example, in August 2017, many refineries and petrochemical facilities in the U.S. Gulf Coast shut down due to concerns about flooding related to Hurricane Harvey. Because most U.S. production and consumption of ethylene occurs in Texas and Louisiana, 54 percent of U.S. ethylene production and 36% of ethylene consumption capacity went offline. More than half of the U.S. polyethylene production capacity was shut down. Additionally, railway service to the plants was disrupted due to flooding.”<sup>91</sup>

The events have been identified as factors that support policy incentives to develop a new petrochemical hub in western Pennsylvania, West Virginia and eastern Ohio.

## *E. Long-Term Competition From Recycling Decreases Demand for Virgin Plastics*

The standard used to project demand for plastics is a multiple of GDP growth.<sup>92</sup> For example, a company like ExxonMobil assumes that plastics demand (polyethylene, polypropylene and paraxylene) exceeds GDP growth by 1 percent.<sup>93</sup> For long-run historical modeling, ExxonMobil currently assumes plastics demand grows at a rate of 4 percent.<sup>94</sup>

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<sup>90</sup> Department of Energy. [Ethane Storage and Distribution Hub in the United States](#). November 2018.

<sup>91</sup> *Ibid.*, p. 78.

<sup>92</sup> According to the most recent International Monetary Fund estimate of world GDP through 2025, the range is from -4.4% to 5.2%. The average annual growth rate for the period 2020-2025 is 2.65%. See: IMF. [Emerging market and developing economies, Datasets](#).

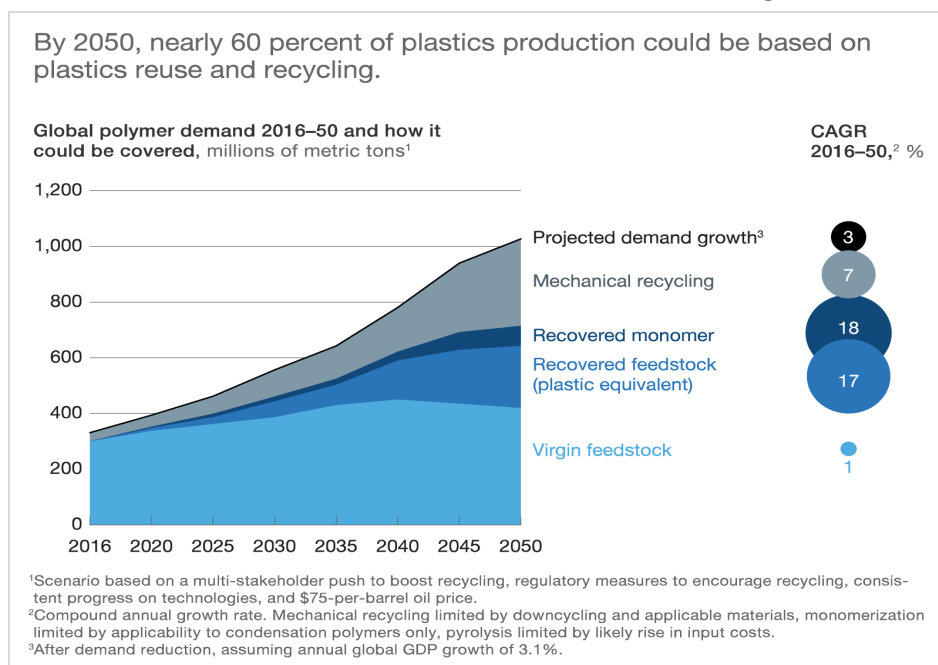
<sup>93</sup> ExxonMobil. [2020 Investor Day Presentation](#). April 2020, p. 106.

<sup>94</sup> American Chemistry Council. [2020 Resin Review](#). May 2020. Annual Growth rate from 2009-2019 for Polypropylene (-0.1), HDPE (2.7%), LLDPE (4.5%) and LDPE (1.3%). *Ibid.* Changes in the economy away from heavy manufacturing have reduced demand for oil and gas. IEA. [2020 Annual Report](#). March 2020. Simultaneously, most of the new capital expenditures from major oil and gas companies are in the petrochemical sector. See: Wall Street Journal. [Firms Like Dow Bet Billions on Plastics. Now There's a Glut](#). October 15, 2020.

The International Monetary Fund estimates that the United States economy suffered a 3.4 percent decline in GDP in 2020.<sup>95</sup> The GDP growth rate is expected to rise to 5.1 percent in 2021 before dropping to 3.5 percent in 2022. Prior to the pandemic, the IMF had estimated that long-term United States GDP growth was in the 2 percent range. Worldwide GDP was expected to drop by 3.5 percent in 2020 and recover to grow by 5.5 percent in 2021; it was projected to slow to 4.2 percent by 2022.<sup>96</sup>

Newer trends, however, must be taken into consideration in evaluating potential growth in the plastics market. Greater investment in plastics recycling has set in motion a fundamental restructuring of the demand for virgin plastics.<sup>97,98</sup> McKinsey projects that the demand for plastics is likely to rise by a compound annual growth rate (CAGR) of 4 percent through 2050. McKinsey estimates, however, that the increase in *virgin* plastic through 2050 will be only 1 percent, with demand for virgin plastics peaking around 2040 and declining thereafter. By 2050, McKinsey estimates that a variety of recycling initiatives will absorb much of the market growth for plastics (See Figure 5).

**Figure 5: Demand for Polymers Covered by Mechanical Recycling, Recovered Feedstock, Recovered Monomers and Virgin Plastics by 2050<sup>99</sup>**



Source: McKinsey & Company.

<sup>95</sup> International Monetary Fund. *IMF Economic Outlook Database*. January 2021.

<sup>96</sup> International Monetary Fund. *World Economic Outlook*. January 2021.

<sup>97</sup> ICIS. *China Plastics Recycling to Lead the World as Virgin Resin Demand Declines*. May 30, 2018.

<sup>98</sup> Forbes. *Why the Oil Industry's \$400 Billion Bet on Plastics Could Backfire*. September 5, 2020.

<sup>99</sup> McKinsey and Company. *How plastics waste recycling could transform the chemical industry*. December 12, 2018.



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The economy will continue to grow, but the standard formulas regarding the relationship between economic growth and plastics growth are undergoing a change that produces an additional risk for new cracker plant investments.<sup>100</sup>

Other market analysts have taken a more cautious approach to the disruptive potential of recycling on virgin plastics demand.<sup>101</sup>

The market share for virgin plastics may be further reduced by product substitution, such as using reusable tote bags instead of plastic bags.<sup>102</sup> In addition, while “bio-based plastics”—made from corn, sugarcane, tapioca, or other forms of cellulose—currently account for only about 1 percent of the market, their use is likely to increase. Allied Market Research reports that the global bioplastic market was valued at \$4.6 billion in 2019 and is projected to reach \$13.1 billion by 2027, growing at a CAGR of 13.8% from 2020 to 2027.<sup>103</sup> Much of this growth is likely to be spurred by government policies and private sector initiatives.<sup>104</sup> Mattel, for example, recently announced that its preschool construction product line will include building sets derived from bio-based resins. Its goal is to achieve 100 percent recycled, recyclable or bio-based plastics materials in its products and packaging by 2030.<sup>105</sup> The low current price of oil makes competition with petrochemical plastics difficult, but if prices rise or governments institute policy incentives such as a carbon tax, this scenario could change. A recent study found that as much as 50 percent of total plastics production could ultimately be vulnerable to competition from bio-based plastics.<sup>106</sup>

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<sup>100</sup> ICIS. [Long term downcycles will transform global petrochemicals creating new winners and losers](#). December 6, 2019. Also see: Businesswire.com. [The Plastic Storm: Ocean Plastic Waste Brewing Tidal Wave of Consumer Activism and Increased Industry Uncertainty](#), HIS Markit Says. October 8, 2018.

<sup>101</sup> IHS Markit. [Plastics sustainability Risks and Strategy Implications](#). May 2019.

<sup>102</sup> Eight states in the U.S.—California, Connecticut, Delaware, Hawaii, Maine, New York, Oregon and Vermont—have banned single-use plastic bags. National Conference of State Legislatures. [State Plastic Bag Legislation](#). November 18, 2020.

<sup>103</sup> Allied Market Research. [Bioplastics Market Outlook - 2027](#). November 2020.

<sup>104</sup> See Rina Singh. [Commentary: The new normal for bioplastics amid the COVID-19 pandemic](#). *Industrial Biotechnology*. 16(4). August 17, 2020. Also see: European Bioplastics Conference. [Bioplastics Market Development Update 2020](#). December 2020.

<sup>105</sup> Mattel. [Mattel Announces Mega Bloks® Bio-Based Plastic Line at Nuremberg Toy Fair](#). January 28, 2020.

<sup>106</sup> Chemistry Europe. [Biodegradable Plastics: Standards, Policies, and Impacts](#). 14(1):56-72. January 7, 2021.

### III. Substantial Long-Term Bond-Rating, Regulatory and Reputational Risks

#### A. Formosa's Bond Rating Is at Risk of Further Deterioration From the Project

Formosa's plan to build a petrochemical complex in Louisiana has contributed to the company's recent credit rating downgrade. Construction costs are pressuring Formosa's financial position at a time when market oversupply and low commodity prices have created uncertainty about future cash flow.

Formosa's credit rating has reflected a history of solid financial performance—revenue growth, positive cash flow and sustainable debt levels. The recent negative credit action is a warning that erosion of its financial status is taking place. On Oct. 16, 2020, Taiwan Rating Service (TRS) lowered Formosa's rating from AA to AA-, citing weak demand, lower profits and uncertain oil prices. TRS issued a stable outlook for the next two years:

**Formosa's plan to build a petrochemical complex in Louisiana has contributed to the company's recent credit rating downgrade.**

"We expect FP group's capital expenditure to increase from 2022 onward, which is several quarters delayed from our previous expectation, due to the impact of COVID-19. FP group plans to build a shale gas-based chemical complex in the state of Louisiana, U.S., costing more than US\$12 billion over two phases. This investment is to support the group's significant expansion, which is likely to improve its geographic diversity and cost structure. However, this project and other expansions in Asia could keep FP group's free cash flow negative and therefore elevate its debt leverage for an extended period after 2022, if profitability does not grow materially."<sup>107</sup>

In addition to a rating downgrade, TRS noted that the cost of the plant would be \$12 billion over the two phases. This is 24 percent higher than Formosa's 2018 estimate of \$9.7 billion.<sup>108</sup> TRS's credit report in 2019 had estimated the cost to be "over \$10 billion, including potential cost overruns into two phases from 2020-2028."<sup>109</sup>

As noted above, Sasol experienced problems with construction management at its petrochemical complex in Lake Charles, and ultimately paid a reported \$12.9 billion

<sup>107</sup> Taiwan Rating Service. [Ratings On Formosa Plastics Group Core Units Lowered To 'twAA-' On Growing Operating Headwinds; Outlook Stable](#). October 16, 2020, p. 2.

<sup>108</sup> Taiwan Rating Service. [Formosa Plastic Group Ratings Unaffected By U.S. Investment Plan](#). April 27, 2018.

<sup>109</sup> Taiwan Rating Service. [Outlooks On Formosa Plastics Group Core Units Revised To Negative On Weakening Credit Metrics; 'twAA/twA-1+' Ratings Affirmed](#). October 22, 2019.

on a project originally estimated at \$8.1 billion, lowering Sasol’s return on the project from 10.4 percent to an estimated 6.0 percent to 6.5 percent.<sup>110</sup> The class-action suit related to the Lake Charles project, announced by investors in Sasol,<sup>111</sup> is based largely on allegations that management concealed the rising costs of construction from investors.<sup>112</sup>

## ***B. Regulatory Risks Could Result in Project Cancellation or Generate Ongoing Regulatory and Political Concerns***

Over the past several years, regulatory decisions on environmental grounds have resulted in multiple cancellations of fossil fuel projects throughout the United States.<sup>113</sup> Moody’s credit rating service, noting the same trend, stated that the instances of project cancellations flowed in part from rising levels of popular opposition. Moody’s also noted that the rating service would remain skeptical regarding energy infrastructure investments and would not offer an unqualified opinion on such projects until they are completed and have achieved commercial operation for a reasonable period of time.<sup>114</sup>

Several outstanding regulatory issues could result in the cancellation of the Formosa project. The state air permit, the federal water permit, and the local land use permit all face community opposition. A recent ruling in the state air permit, moreover, places a focus on broad social justice issues in the case that could have far-reaching effects. Growing concerns about the project may also point to questions regarding the project’s tax exemption.

### **1. Federal Agency Reconsidering Water Permit**

The U.S. Army Corps of Engineers had issued a Clean Water Act and Rivers and Harbors Act permit in 2019 for the Formosa project, which faced a legal challenge on several issues, including the agency’s failure to conduct an environmental impact statement pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4332(2)(C). But the Army Corps suspended the permit on Nov. 10, 2020, so that it could conduct a new review of relevant issues. In response to a complaint that challenged its assumption about whether certain sites could be considered as potential alternative locations for the project, the Army Corps stated that it had “determined it to be in the public interest” to suspend the permit while it re-

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<sup>110</sup> For a discussion of the Sasol construction and finance, see: IEEFA. [Shell’s Pennsylvania Petrochemical Complex: Financial Risks and a Weak Outlook](#). June 2020.

<sup>111</sup> Hagens Berman. [Hagens Berman, national trial attorneys, urges investors in Sasol Limited \(SSL\) who have suffered losses to contact its attorneys: firm investigating possible securities fraud](#). January 27, 2020.

<sup>112</sup> [Memorandum Order, Moshell, et al. v. Sasol Limited](#), No. 20-cv-1008. U.S. District Court, Southern District of New York, August 24, 2020.

<sup>113</sup> Global Energy Institute. [Infrastructure Lost: Why America Cannot Afford to Keep It In the Ground](#). December 2018. Also see: IEEFA. [IEEFA Response to the U.S. Chamber of Commerce Analysis of the “Keep it in the Ground” Movement](#). February 2019.

<sup>114</sup> Moody’s Investor Services. [Shifting environmental agendas raise long term credit risk for natural gas investments](#). September 30, 2020 (Proprietary License).

evaluated its alternatives analysis “and other aspects of the permit decision if appropriate.”<sup>115</sup>

If the Army Corps issues a new permit for the facility at the same site, the community and environmental organizations that oppose the project will have an opportunity to bring a new appeal.

## 2. State Air Permit Called Into Question Over Environmental Racism

On Jan. 15, 2020, the Louisiana Department of Environmental Quality (LDEQ) granted an air permit to Formosa for 14 units of its proposed petrochemical complex in St. James Parish. In February 2020, a coalition of environmental and community organizations filed a legal challenge to the permits on the grounds that the permits would allow dangerous and carcinogenic pollutants to be released in quantities exacerbating violations of the Clean Air Act.<sup>116</sup> The plaintiffs also contend that the LDEQ failed to adopt the best available technology to ensure proper monitoring and ignored significant releases of greenhouse gases.

The plaintiffs framed these issues in the context of environmental racism. The complaint argued that the Formosa site is located in a community with a high concentration of African-Americans. The population in the St. James Parish district where the petrochemical complex would be located is 91 percent Black.<sup>117</sup> The complaint provided further detail, as follows:

“According to the U.S. Census Bureau, which combines Welcome and St. James into one census tract, the communities have a population of over 2,000 residents, 87.1 percent of whom identify as “Black or African American.” EPA’s environmental justice screening and mapping tool ... underscores this information. EJScreen data show that of the 1,064 residents of Welcome, 93 percent are minority. In addition, directly across the river, the community of Union ... has a 64 percent minority population. For perspective, St. James Parish has a minority population of 52 percent, and Louisiana’s minority population is 41 percent. Further, the Fifth Ward Elementary School ... serves a student population that is 99 percent black. This school is just one mile from Formosa’s site ...”<sup>118</sup>

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<sup>115</sup> U.S. Army Corps of Engineers. Notice of Suspension of Department of the Army Permit MVN-2018-00159-CM. November 10, 2020. Also see U.S. Army Corps of Engineers. Findings for Suspension (submitted in a court proceeding on November 13, 2020). The agency had failed to analyze five potential alternative sites based on an incorrect belief that they were ineligible, wrongly believing the area violated the Clean Air Act’s ozone standard.

<sup>116</sup> [Petitioners Brief in Support of Their Petition for Judicial Review](#), *Rise St. James, et al. v. Louisiana Dept. of Environmental Quality*, No. 694,029, 19<sup>th</sup> Judicial District, Parish of East Baton Rouge, February 14, 2020.

<sup>117</sup> U.S. Census Bureau. [American Community Survey 5-year Estimates, 2015-19](#). December 2020.

<sup>118</sup> Petitioner’s Brief, *op. cit.*, p. 7.

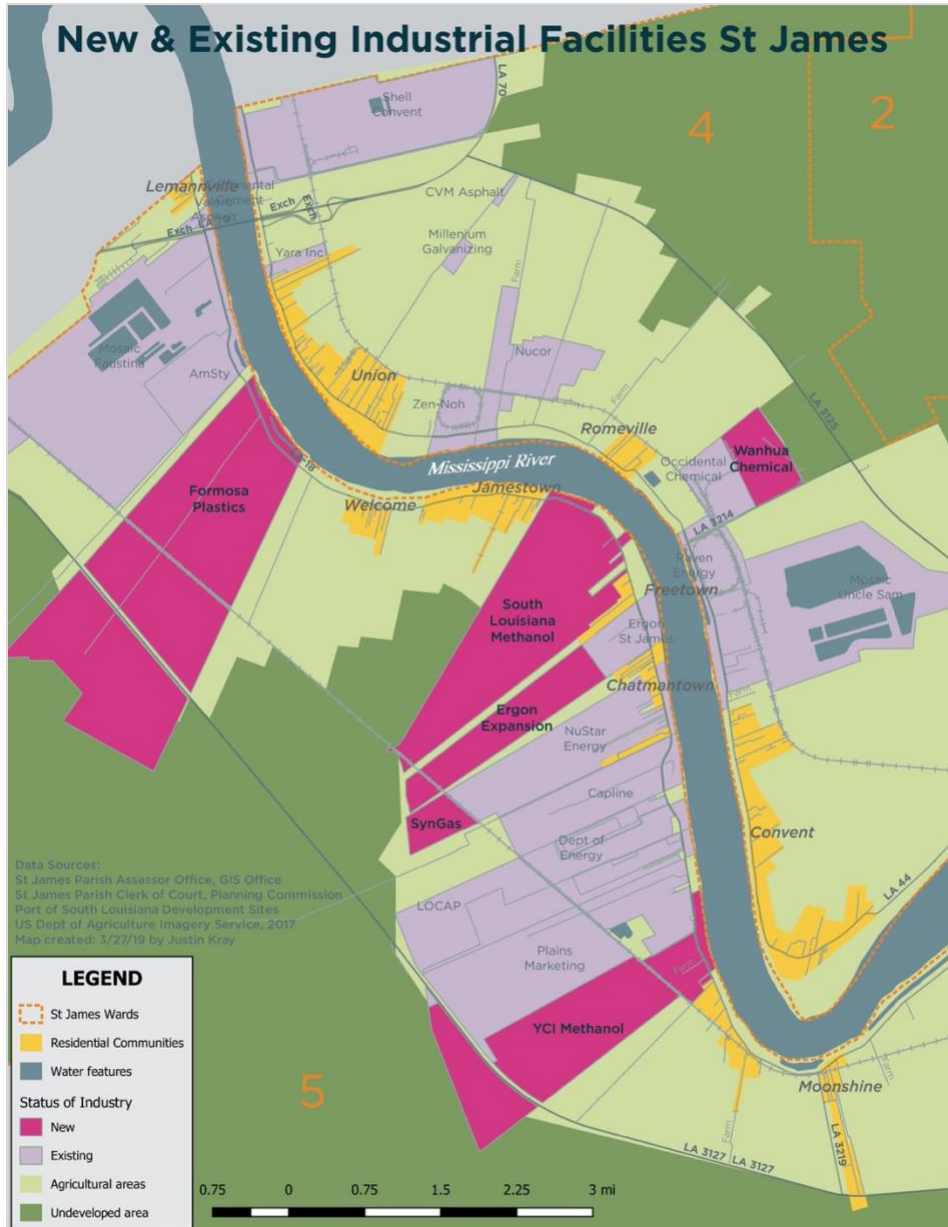
The complaint documented that the community is already saturated with dozens of active industrial sites that make the location one of the most heavily polluted residential areas in the United States. It stated:

“The area immediately surrounding the proposed plant is home to dozens of major sources of industrial pollution ... Indeed, four of the top five existing toxic chemical releasers in St. James Parish are within four miles of the Formosa Plastics' site, and nearby Donaldsonville is among the 50 most toxin-producing cities in the U.S. LDEQ recently issued air permits for the construction of two major methanol plants in the community of St. James (YCI Methanol and South Louisiana Methanol, both which are racing to build the largest methanol plants in North America), as well as a permit that allows Nucor (an iron manufacturing facility) across the river to expand.”<sup>119</sup>

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<sup>119</sup> Petitioner's Brief, *op. cit.*, p. 8.

Figure 6: Map of New and Existing Industrial Facilities in St. James Parish<sup>120</sup>



Source: Justin Kray, Louisiana Bucket Brigade.

St. James Parish is situated along a river corridor known as “Cancer Alley” for the high number of chemical plants in the area. President Biden, in remarks while signing executive orders on environmental policy, cited Cancer Alley as one of the “hard-hit areas” of concern in the United States with regard to “the disproportionate

<sup>120</sup> Image produced by Justin Kray for the Louisiana Bucket Brigade (submitted as attachment to [Petitioners Brief in Support of Their Petition for Judicial Review, Rise St. James, et al. v. Louisiana Dept. of Environmental Quality, op.cit.](#)).

health and environmental and economic impacts on communities of color—so-called ‘fenceline’ communities.” The complaint cited an air modeling expert’s analysis prepared for a news consortium’s investigative report, which revealed that the community’s air has more cancer-causing chemicals than 99.6 percent of industrialized areas in the United States.<sup>121</sup> They contended that Formosa’s air permit would allow the facility to triple the toxic pollution for the neighborhoods within a mile east of the site and double it for the community that lies just across the Mississippi River.<sup>122</sup> For example, it would release large amounts of ethylene oxide, which has been linked to lymphocytic leukemia, breast cancer and other cancers, and miscarriages.<sup>123</sup>

The complaint alleges that the LDEQ failed to consider the disproportionately high levels of respiratory illnesses in the area and, more generally, the overburdened impact on the community of the 14 existing industrial facilities in the vicinity.<sup>124</sup>

On Nov. 18, 2020, District Judge Trudy White remanded the permit proceeding back to the LDEQ for further analysis, with instructions to properly assess the issue of environmental racism.<sup>125</sup> The court presented the following justifications at the hearing when issuing the remand order:

**The community’s air  
has more cancer-causing  
chemicals than 99.6  
percent of industrialized  
areas in the United States.**

“I agree that the environmental justice analysis was inadequate in this particular case ...

“Inherent, in the court’s opinion, in a robust environmental justice analysis is the recognition that environmental racism exists, and that environmental racism operates through the state’s institutions. An objective evaluation of Louisiana’s and LDEQ’s institutional power is influenced by the attitudes and actions of the institution’s personnel, its policies, its laws, its practices, its structures and its history. The operation of the institutional power may be

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<sup>121</sup> ProPublica. [In a Notoriously Polluted Area of the Country, Massive New Chemical Plants Are Still Moving In.](#) October 30, 2019.

<sup>122</sup> ProPublica. [What Could Happen if a \\$9.4 Billion Chemical Plant Comes to ‘Cancer Alley.’](#) November 18, 2019.

<sup>123</sup> Environmental Protection Agency. [Evaluation of the Inhalation Carcinogenicity of Ethylene Oxide \(Final Report\).](#) EPA/635/R-16/350Fc. December 2016. Also see: Agency for Toxic Substances and Disease Registry. [Toxicological Profile for Ethylene Oxide: Draft for Public Comment.](#) September 2020.

<sup>124</sup> Petitioner’s Brief, *op. cit.*, pp. 44-49.

<sup>125</sup> Judgment (on a Rule to Show Cause Why Intervenor Beverly Alexander’s Motion for Judicial Notice of Adjudicative Facts and to Admit Proof of Procedural Irregularities), *Rise St. James, et al. v. Louisiana Dept. of Environmental Quality*, Case No. 694,029, 19th Judicial District, Parish of East Baton Rouge (December 16, 2020, Trudy White, J.). Also see: [The Advocate. Judge delays crucial permit for Formosa plastics plant; requires deeper analysis of racial impacts](#), November 18, 2020.

intentional or it may be unintentional. Even though an institution may operate within the legal parameters, the institution may not be righteous, or just in its actions.

“An environmental justice analysis is more than LDEQ going through the motions of soliciting public comment, and then—and then giving lip services to an analysis, or not even having a procedure in place as to how to conduct the review itself with respect to an environmental justice analysis, and then, take it a little further, just ignore or discard community input ...

“To provide service to the people of Louisiana through a comprehensive environmental protection, to me, requires that permits to issue with a complete environmental justice analysis ... but I can't say the LEDQ truly balanced the competing interests related to pollution and health risk, and that's what the pollution and health risk is that what was before the court today.

“I can't say that they did that within a reasonable certainty, unless there is more pointed analysis in its basis for a decision. Conclusions without analysis is not enough. Show me the data on review. Show me the science ...

“I'm not restricting anyone from taking any other particular action in this matter, but the court is strongly encouraging the plaintiffs, the defendant, and the intervenors to meet with the goal of reaching a consensus judgement that will result in the dismissal of the judicial review. I recognize that that may be difficult, if not impossible; but I do encourage the parties to get together to see if they can fashion the best possible outcome.”<sup>126</sup>

The concern for environmental injustice rests in the Louisiana Constitution, which establishes a public trust in the natural resources of the state, including air and water. It requires resources be protected, conserved, and managed “consistent with health, safety and welfare of the people.” The Louisiana Supreme Court has interpreted this duty to mean that the state's environmental agencies “must act with diligence, fairness and faithfulness to protect this particular public interest in the resources.”<sup>127</sup>

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<sup>126</sup> Partial Transcript of Court's Oral Reasons and Ruling, Motion for Judicial Notice of Adjudicative Facts and to Admit Proof of Procedural Irregularities, *Rise St. James, et al. v. Louisiana Dept. of Environmental Quality*, Case No. 694,029, 19<sup>th</sup> Judicial District, Parish of East Baton Rouge, November 18, 2020, pp. 4-7.

<sup>127</sup> Louisiana's state constitution recognizes that a public trust exists for the protection, conservation and replenishment of all the natural resources of the state. The 1974 Louisiana Constitution specifically lists air and water as natural resources, commands protection, conservation and replenishment of them insofar as possible and consistent with health, safety and welfare of the people, and mandates the legislature to enact laws to implement this policy. La. Const. art. IX § 1. The Louisiana Supreme Court declared that the state's environmental agency therefore “must act with diligence, fairness and faithfulness to protect this particular public interest in the resources.” *Save Ourselves, Inc. v. La. Environ. Cont. Comm'n*, 452 So. 2d 1152, 1157 (La. 1984).



In the Formosa case, the court set out a basic tenet from which an analysis and partial remedy flowed: “Environmental racism exists.”

The court recognized that the underlying intent of the law seeks righteousness and justice but the state, through institutional policies and practices, and the “attitudes and actions” of agency personnel, may deliver fundamentally unfair, racist outcomes. The court referred to public officials paying mere “lip service” to the law—just going through the motions of taking public comment but then ignoring or discarding community input—when legal requirements for environmental justice conflict with unwritten discriminatory policies. The voices of those who are burdened by the location of yet another industrial polluter in their community are silenced when officials charged with law enforcement provide only lip service to the issue.

**“Environmental racism  
exists.”**

**Louisiana District Court  
Justice Trudy White**

The court also identified the lack of a diligent, robust analysis of the facts of the environmental burden—the adverse public health and environmental consequences. The agency had received 10,000 public comments on the project, and the plaintiffs provided significant data and information. The comments, data and information were to be weighed against Formosa’s environmental and economic analysis of the project’s benefits. The court noted that the LDEQ did not even demonstrate that it had “a procedure in place as to how to conduct the review.” The analysis submitted to the court by the LDEQ (and Formosa) was incomplete and lacked rigor. The court considered the purpose of the law and its historical context as well as LDEQ’s data and analysis, the quality of LDEQ’s procedures and its responsiveness to stakeholder involvement. The judge concluded: “I can’t say LDEQ truly balanced the competing interests.”

The district court’s interim order attempted to use judicial oversight to ensure a more meaningful stakeholder process. The First Circuit Court of Appeals, on March 15, overturned the District Court’s order on procedural grounds and remanded the case back to the District Court for further proceedings without ruling on the merits of the issue itself. The plaintiffs are considering their options.

### **3. Environmental Racism Is an Important Factor in Assessing the Financial, Political, and Regulatory Risks of the Formosa Project to the Company and to Government**

The Formosa project has an impact on the creditworthiness of Formosa, the state of Louisiana and the United States government. All three are issuers of bonds and all

three are financially strong. The financial risks related to Formosa’s credit rating are discussed above ([Section I](#)).

This section focuses more narrowly on the impact of racism on the basic financial structure of the Formosa project to identify how it plays a significant role in understanding the risks faced by Formosa, Louisiana and the United States government if the company proceeds with this project.

Companies and governments conduct their business as part of larger cultural, economic and political trends. A company or government must contend with many factors outside its control. How it carries out its mission amid a constantly changing landscape of trends and events has consequences for its financial condition. Moody’s credit rating service has written extensively on the topic of Environmental, Social and Governance (ESG) issues and their effect on a bond issuer’s credit rating (governments and private sector corporations). Moody’s and other credit rating services try to capture these dynamics through the ESG analysis as part of the assessment of the financial status of a company or government. Racial issues are generally included in the social risk category.

Moody’s broader methodological approach to ESG issues, including racial inequality, sets out the nature of the risks and how Moody’s assesses the issues and includes its ESG findings in a credit rating.<sup>128</sup> The ESG assessment distinguishes risks between private and public sector entities. It then provides a separate set of risk factors and underlying considerations that are taken into account in weighing both quantitative and qualitative aspects of ESG risks.

On the question of race in the United States, particularly the status of Black Americans, Moody’s issued an analysis in July 2020:

**“The strength of the US’s institutions has diminished somewhat in recent years in the context of the increasingly polarized political environment.”**

**Moody’s Investor Service**

“Recent events have highlighted the corrosive impact of inequality in the United States (US, Aaa stable) with a particular focus on the long-standing, deeply institutionalized inequality faced by the Black community. In past research, we have noted how income and wealth inequality in the US is both high relative to other highly rated countries and rising, and that it could have a negative impact on the US’ fiscal, economic and institutional strength. The unequal position of the Black community in the US is a salient and

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<sup>128</sup> Moody’s Investor Service. General Principles for Assessing Environmental, Social and Governance Risks Methodology, Cross Sector Rating Methodology. December 14, 2020. Hereafter, “Moody’s Methodology.”

persistent feature of the inequality dynamic that exemplifies and exacerbates credit-relevant social risks.”<sup>129</sup>

Environmental racism worsens the experience of social injustice by exacerbating inequality in environmental health protections, which makes it a credit-relevant risk to the fiscal, economic and institutional strength of the United States.

Formosa and the federal and state levels of government face a high likelihood that approval of the project would exacerbate the impact of environmental racism on the affected community. This creates risk factors.

#### *a. Formosa's Risk Factors*

The decision to locate the Formosa project in Welcome, La., has generated public opposition because of the high concentration of Black residents and the numerous industrial facilities already located in the community that emit significant amounts of toxic pollution. The fact that this project would increase toxic emissions in the area, combined with the contentious stakeholder engagement process and other factors, increases the social risk faced by the company.

The Formosa project also faces governance questions related to the management of its regulatory relations and the quality of its financial reporting.<sup>130</sup>

More broadly, Formosa's environmental track record over the last 10 years has been a source of controversy.<sup>131</sup> In the United States, Formosa has been the subject of 98 state and federal civil environmental enforcement actions, 53 of which were brought for violations of the Clean Water Act. In Vietnam, Formosa had to pay \$500 million for repeatedly violating the country's clean water laws,<sup>132</sup> and substantial fines have been levied against the company in the United States.<sup>133</sup>

Moody's summarizes the broad risk factors that would be applicable to a private company such as Formosa:

“For private sector issuers, we view social considerations as falling broadly into two categories: i) issuer specific considerations, such as product safety problems that harm an issuer's reputation; and ii) the adverse effects of

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<sup>129</sup> Moody's Investor Services. Government of United States: Racial disparities exemplify the long-standing and growing income and wealth inequalities that raise social risk. Sovereign and Supranational, Issuer Comment. July 14, 2020. (Report Proprietary license, available upon request). Also see: Moody's Investor Services. [Research Announcement: Moody's - US racial, wealth and income inequality raises sovereign-related social risks](#). July 14, 2020.

<sup>130</sup> See: Moody's Methodology.

<sup>131</sup> Business & Human Rights Resource Centre. [Groups march in Taiwan to protest air pollution; ask local govt. to stop issuing permits to a Formosa Plastics naphtha cracking plant](#). June 10, 2017.

<sup>132</sup> [Petitioners Brief in support of their petition for Judicial Review, Rise St. James, et al. v. Louisiana Dept. of Environmental Quality, op. cit.](#)

<sup>133</sup> Texas Tribune. [Plastic company set to pay \\$50 million settlement in water pollution suit brought on by Texas residents](#). October 15, 2019.

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external factors, such as regulation that leads to higher compliance costs or creates rigid work rules.”<sup>134</sup>

A critical component of social risk for companies is their relationship with host communities for their projects. The court criticized the quality of the LDEQ and Formosa disclosures regarding the racially discriminatory environmental burdens on the community and the environmental racism implications of the project’s impact in that context. The fear expressed by the court that the parties would not be able to reach agreement goes to the company’s approach to its social responsibility (concern for the personal health and safety of community residents), the quality of its stakeholder relationships, and its awareness of the historical and current conditions of environmental racism in St. James Parish. The company has paid inadequate attention to these factors, leaving Formosa exposed to litigation, unforeseen costs from legal settlements and damage to its reputation.

The company’s handling of conflicts in the United States is a critical risk factor for this project. Many boards look to diversify their composition, with an emphasis on including board members who have a working knowledge of market and political conditions in countries where the company is doing business.<sup>135</sup> A company’s lack of understanding of a country where it engages in business activities can result in costly errors. Moody’s recent review of conditions in the United States is a clear and direct warning to all companies that responsible stakeholder engagements in communities with heavy concentrations of Black residents require a heightened awareness of local political and social history.

### *b. Risk Factors for Louisiana and the United States Government*

Moody’s recent review of conditions of inequality in the United States and the court’s specific references to environmental racism in Louisiana highlight the nature of the problem and the short- and long-term risks associated with it. Moody’s analysis focuses clearly on the financial risks that are raised:

“High inequality is also associated with relatively lower institutions and governance strength, and the political polarization often associated with it can raise susceptibility to event risk. While the US’ institutions remain very strong overall from a credit standpoint and political event risk remains low, the social risks implied by entrenched racial inequalities were amply demonstrated by the widespread protests in the US following the death of George Floyd on May 25 while in police custody in Minneapolis (Aa1 stable). While largely centered on the role of the police and on the criminal justice system, long-standing issues relating to the willingness and capacity of US legislators to address racial inequality through institutional and governance reforms have also gained prominence.

“Even if the immediate credit implications of the protests were limited, rising social risk, if left unaddressed by policymakers, can carry negative longer-term implications. The strength of the US’ institutions has diminished

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<sup>134</sup> Moody’s Methodology.

<sup>135</sup> Marsh & McLennan. *Governing the Global Company*. 2015.

somewhat in recent years in the context of the increasingly polarized political environment. And there is a rising tension within the US' credit profile arising from the growing need for policymakers to act to contain the ongoing erosion of the sovereign's fiscal strength, and the inertia with respect to that erosion stemming from increased political polarization. Some research suggests that income plays an increasing role in driving congressional polarization on tax and redistribution issues. While there are indeed many social and economic issues that have contributed to the US' increased political polarization in recent years, looking ahead, the combination of income and racial inequality is set to be a potent force for further potential polarization and inertia."<sup>136</sup>

The court's opinion, which highlights the problem of environmental racism in Louisiana, focuses on the institutional nature of racism in state institutions, like LDEQ. It expresses concern that the "institutional power" of the state and LDEQ, as exercised over time, demonstrates a historical propensity to racism. The court views the problem as pervasive, if not insidious. When lip service is the response to legitimate community voices, the institutional check to remedy racial injustice can become just another example of the same injustice.

Moody's analysis considers the implications of weak enforcement and oversight. On the issue of federal and state enforcement of discrimination laws, it concludes: "Weak governance may also result from weak oversight from the relevant upper level of government."<sup>137</sup> Moody's is pointing to an inherent problem not only in the existence of environmental racism but also in the area of enforcement of the laws. As the court pointed out, enforcement of discrimination laws can be frustrated by government officials who have racist attitudes. Breakdowns in intergovernmental enforcement mechanisms can stem from uncoordinated federal and state legal construction, or simply bad policy and coordination.

When the law breaks down, extralegal paths such as social disruption and capital flight have a political impact. Within the bounds of law, numerous risks are associated with a failure in enforcement: Increases in environmental deterioration (long-term contamination of air, land and water, and number and types of events); health and property consequences; persistent litigation and its associated costs (for all parties—legal fees, fines, settlements); weakened credibility for companies; loss of confidence in the legislative, executive and judicial branches of government; and less transparency due to misleading or withheld information.

While these risks cannot always be measured directly in dollars and cents, the loss of society's ability to solve problems through institutional action undermines the type of certainty needed to operate public institutions and private companies effectively.

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<sup>136</sup> Moody's Investor Services. Government of United States: Racial disparities exemplify the long-standing and growing income and wealth inequalities that raise social risk. Sovereign and Supranational. Issuer Comment. July 14, 2020.

<sup>137</sup> Moody's Methodology. *op. cit.*

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Based on the current state of race relations in the United States, Moody's has recently offered a cautionary note to national governments with strong financial structures and well-managed political governance:

“Even if the immediate credit implications of the protests were limited, rising social risk, if left unaddressed by policymakers, can carry negative longer-term implications. The strength of the US' institutions has diminished somewhat in recent years in the context of the increasingly polarized political environment. And there is a rising tension within the US' credit profile arising from the growing need for policymakers to act to contain the ongoing erosion of the sovereign's fiscal strength, and the inertia with respect to that erosion stemming from increased political polarization. Some research suggests that income plays an increasing role in driving congressional polarization on tax and redistribution issues. While there are indeed many social and economic issues that have contributed to the US' increased political polarization in recent years, looking ahead, the combination of income and racial inequality is set to be a potent force for further potential polarization and inertia.”<sup>138</sup>

All of the major elements of concern raised by Moody's are acutely present in the Formosa project. Community advocates see the Formosa project as a disturbing example of longstanding indifference to the impacts of environmental racism. The promised economic benefits from state and company officials ring hollow in the face of decades of industrial investment and decades of persistent poverty, and the judge in the air permit case has called into question this institutional failure.

#### **4. New Facts and Analysis Have Led to a Recent Challenge of the Project's Local Land Use Permit Granted by the St. James Parish Council**

The St. James Parish Council granted Formosa a land use permit in January 2019. The permit allows the construction and operation of the 14 units of production facilities. Local residents contend the permit was granted on the condition that some of the facilities would be relocated further away from a local school and a church. The agreed-upon amendment to the site plan, they assert, was not incorporated into subsequent filings. The residents also noted two factual matters that the parish council had not reviewed in making its decision but that subsequently became known publicly. The first was the air pollution analysis produced by the news consortium that identified the heavy burden of toxic pollution already borne by the community and found that the Formosa project would double or triple that toxic burden.<sup>139</sup> The second was information about the presence of historically and

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<sup>138</sup> Moody's Investor Service. Government of United States: Racial disparities exemplify the long-standing and growing income and wealth inequalities that raise social risk (PBM 1236663). July 14, 2020 (proprietary license).

<sup>139</sup> ProPublica, *op. cit.*

culturally significant burial grounds on the Formosa site that may hold the remains of enslaved people.<sup>140</sup>

EarthJustice filed a petition to the parish council on Dec. 23, 2019, to reopen the permit proceeding on the environmental grounds,<sup>141</sup> and the Center for Constitutional Rights filed a similar petition regarding the need to consider the significance of the burial sites.<sup>142</sup> The matter is still pending, and creates a risk that the parish could either revoke the permit or require a change in the project location or configuration that could add further delays or increase the construction costs.

## **5. A Local Property Tax Exemption That Was Approved in April 2018 Now Faces Substantial Issues but May Be Beyond the Reach of State and Local Oversight Authority**

### *a. Statutory and Regulatory Background*

Section 21F of the Louisiana Constitution of 1974 allows the Louisiana Board of Commerce and Industry, with the governor’s approval, to exempt new manufacturing facilities from paying property taxes for up to five years, with the potential for a second five-year extension. To grant the exemption, the board and governor must determine that the exemption is “in the best interest of the state.”<sup>143</sup>

Under the current rules of the board for the Industrial Ad Valorem Tax Exemption Program (ITEP),<sup>144</sup> an application for the exemption must disclose certain information, including: Ownership, location of the parcel(s), type of manufacturing, estimated cost of construction, number of jobs to be created during construction and operation, and estimated start and completion dates of construction. The application must include exhibits certifying that the local parish and sheriff have approved the project.

On June 24, 2016, the state amended the regulations to allow input from local parishes, municipal governments, school boards and sheriffs on whether an industrial tax exemption should be granted, as well as the extent of the exemption and any terms or conditions for it.<sup>145</sup> These reforms, initiated by Gov. Edwards, granted the right of the local parish to review the project. Under previous rules, only the Board of Commerce and Industry reviewed and approved the application.<sup>146</sup> The

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<sup>140</sup> New Orleans City Business. [Formosa to delay construction of \\$9.4B St. James Parish plant](#). July 24, 2020.

<sup>141</sup> Earthjustice. [Letter to Saint James Parish Council](#). December 23, 2019.

<sup>142</sup> St. James Parish Council. [Notice of Public Meeting and Agenda](#). January 7, 2020.

<sup>143</sup> [Louisiana Constitution of 1974, § 21F](#).

<sup>144</sup> Louisiana [Administrative Code tit. 13, § I-501 \(Industrial Ad Valorem Tax Exemption Program\)](#), Vol. 46, No. 11. For detailed description of the administrative history of the rule promulgation process see: Louisiana Economic Development. [Rules for Industrial Tax Exemptions](#).

<sup>145</sup> *Ibid.*, § I-501 (A).

<sup>146</sup> Governor Edwards cited several types of weak oversight in the administration of the program: 1) overly generous eligible costs; 2) no state or local oversight related to the size of individual exemptions; 3) failure to compare with other jurisdictions and 4) no oversight concerning the

governor's reform requires the board to notify the parish council and other local entities of the ITEP application. It allows the parish council the option to issue a public notice and hold a public meeting on the matter, and to pass a resolution in favor or against the exemption.<sup>147</sup>

*b. Formosa Slipped Its Tax Exemption Advance Notification Document Into the Board's Filing System Just Before the Reform Took Effect*

Formosa filed its advance notification for ITEP exemption on June 23, 2016—exactly one day before the reforms took effect, allowing the project to be “grandfathered” and thus escape the regulatory reform requirement for input from the parish council and other local entities.<sup>148</sup> Formosa sought—and received on April 25, 2018—approval for tax relief on its \$9.4 billion investment in the amount of \$150.2 million per year for ten years.<sup>149</sup> Over that decade, the potential cost of the exemption would rise to more than \$1.5 billion.<sup>150</sup>

But this filing occurred well before the project was actually ripe. The project was not supposed to start until January 2019. The estimated start date in the initial application is June 1, 2019, and the end date is June 22, 2022.<sup>151</sup> The LED website now states that the start date is Jan. 1, 2019, and the end date is Dec. 31, 2028.<sup>152</sup>

Although the project was delayed by the pandemic, the start date of January 2019 occurred more than a year before the pandemic's onset. The original end date was supposed to be June 2022 and currently is 2028. As noted above, Formosa has not made the final investment decision on the project. Preliminary construction proceeded in fits and starts,<sup>153</sup> until the company decided in November 2020 to stop

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aggregate impact of the exemptions on Louisiana's annual budget. The Governor stated that the average annual expenditure at the time was \$1.4 billion per year.

<sup>147</sup> *Ibid.*, § I-503 (H)(1-2).

<sup>148</sup> Louisiana Economic Development. [Fast Lane Public Search, Advance Reports, FG LA LLC, \(ID # 20161542\)](#). Retrieved February 1, 2021.

<sup>149</sup> Louisiana Economic Development. [Fast Lane Public Search, Board Approved ITEP Project Results, FG LA LLC, \(ID#20161542\)](#). The estimated total investment in the plant is listed as \$9.4 billion, and the project as approved is estimated to generate 1,200 permanent jobs and 5,000 temporary construction jobs.

<sup>150</sup> The Advocate. [Major Formosa plastics plant in St. James may cost \\$12 billion, rating agency estimates](#). December 15, 2020. The price of the plant could rise to \$12 billion, according to a credit rating issued by an S&P Global Company. If the price increases, the tax exemption could rise to \$191.2 million per year, or \$1.9 billion over the 10-year period.

<sup>151</sup> Louisiana Economic Development. [Fast Lane Public Search, Advance Reports, FG LA LLC, \(ID # 20161542\)](#). Retrieved February 1, 2021.

<sup>152</sup> Louisiana Economic Development. [Fast Lane Public Search, Board Approved ITEP Project Results, FG LA LLC \(ID#20161542\)](#). Retrieved February 1, 2021.

<sup>153</sup> Courthouse News Service. [Construction of Plastics Plant Comes as Surprise to Louisianans](#). March 25, 2020.



work due to the coronavirus.<sup>154</sup> The company has since stated that it will not proceed with the project until the coronavirus is brought under control.<sup>155</sup>

With an indefinite date for a final investment decision, an indefinite delay in construction, and an indefinite date for the commencement of commercial operation, the initial advance notification is going into its fifth year.

### *c. Questionable Appropriateness of the Tax Exemption for the Project*

State law requires the governor and the Board of Commerce and Industry to approve tax exemptions when they are in the public interest. With the erosion of the market and recent signs of distress in Louisiana, the rising construction prices, a bond downgrade and changing market conditions, the answer to whether this project is needed for the purposes of creating a robust economy appears to be, "No."

**The answer to whether this project is needed for the purposes of creating a robust economy appears to be, "No."**

As explained above, the project has taken on a greater level of speculation from a market perspective since the plan was initiated in 2016. Substantive issues related to air pollution and other environmental impacts need to be settled. The company and the project face several regulatory problems that are likely to have a material impact on the project design and cost.

The site location, as noted above, is a source of social division. The racism concerns are structural and perhaps beyond remediation. Any new plan to address the issues, which the Louisiana court has strongly encouraged, will come with a price tag. Recent complaints raised concerning the company's disclosures on land use matters has harmed the company's credibility and weakened its relationship with local residents and the local judiciary.

The governor's concern that the tax exemption program suffered from a lack of prudence and diligence was prescient. The grandfathering provision that exempted the project from the parish council's oversight was bad policy, as it allows an increasingly speculative investment to remain beyond the reach of state oversight authority. More careful scrutiny and monitoring of this project is needed.

## **6. Trade Considerations**

The United States views Taiwan as an ally in its efforts to promote democracy, support strong economies in both countries and check Chinese influence in Asia.<sup>156</sup> With the election of a new administration in Washington, the general outlook for

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<sup>154</sup> S&P Global Platts. [Formosa Taiwan unit indefinitely delays \\$9.4 billion Louisiana petrochemical complex](#). November 23, 2020.

<sup>155</sup> ISIS. [Formosa defers major construction on U.S. Sunshine petrochemicals project](#). October 19, 2020.

<sup>156</sup> Brookings Institution. [A Case for Optimism on US-Taiwan Relations](#). November 30, 2020.

trade relations with Taiwan is expected to improve.<sup>157</sup> In 2019, foreign direct investment from Taiwan in the United States was \$11 billion.<sup>158</sup> Investment in both directions is likely to increase, particularly in machinery, wholesale trade and finance.

While Formosa's petrochemical project represents a significant new investment, it is replete with problems. The government and citizens in both countries have raised significant concerns about pollution. Formosa has looked to invest in plastic manufacturing outside of Taiwan due in part to public opposition to air and water pollution in Taiwan.<sup>159</sup> Its investments in China, Vietnam and other countries in the region, as well as in the United States, have been substantial—but not without controversies tied to pollution and geopolitical conflicts.

The recent concern raised by the Louisiana district court regarding environmental justice issues posed by the Formosa project's air permit, brings up a fundamental concern. In essence, the issue of environmental racism is now an issue for Formosa, the government of Taiwan and the United States.<sup>160</sup>

As noted above, the markets for the proposed Formosa project's products are currently oversupplied, and the ability of economic growth to absorb existing capacity is uncertain. Profitability of new investment in the petrochemical industry has faltered along the economic chain, with oil and gas and plastic production businesses facing financial distress. Such thorny problems are not likely to enhance U.S. trade relations with Taiwan.

Formosa faces several financial and reputational risks from these regulatory and political matters. The judicial and administrative proceedings could result in reversal of a permit approval and a denial of the project. New investments may be required to address the emissions and racial discrimination issues that are involved. From the questionable tax exemption at the local level to the potential effects of the controversy on global trade relations, the project raises a range of political concerns. Finally, it is likely that, given the level of citizen opposition to the project, Formosa would be confronted by ongoing challenges to its environmental compliance record.

## V. Conclusion

The claim that low-cost natural gas provided a sufficient incentive to move forward with the project has proven problematic. Regardless of questions about prices of natural gas, moreover, important areas of weakness along the petrochemical value chain have undermined the company's investment thesis. Prior to the pandemic, analysts were already sending signals that the global buildout of cracker facilities was creating an oversupplied market. The proposed Formosa project was identified

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<sup>157</sup> *Ibid.*

<sup>158</sup> United States Trade Representative. [U.S.-Taiwan Trade Facts](#). Retrieved December 2, 2020.

<sup>159</sup> Bloomberg. [A Plastics Giant That Pollutes Too Much for Taiwan Is Turning to America](#). December 12, 2019.

<sup>160</sup> The Advocate. [Judge delays crucial permit for Formosa plastics plant; requires deeper analysis of racial impacts](#). November 18, 2020.

as a cause for concern because its entry into the market was likely to contribute to the oversupply.

Markets for plastics and the petrochemical sector are oversupplied and the coronavirus pandemic has intensified these concerns.

Formosa has delayed its final investment decision, in part due to the pandemic and in part due to troubling market forces. It is also facing a significant increase in the construction costs of the complex and weakening profit picture.

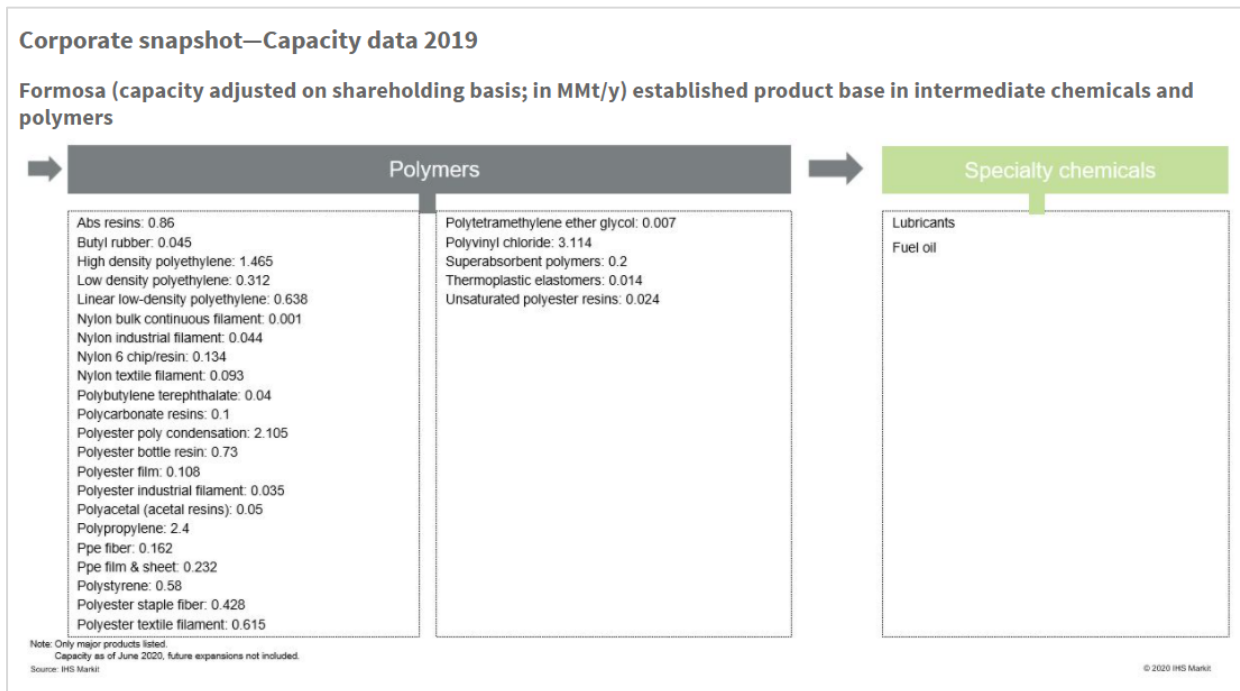
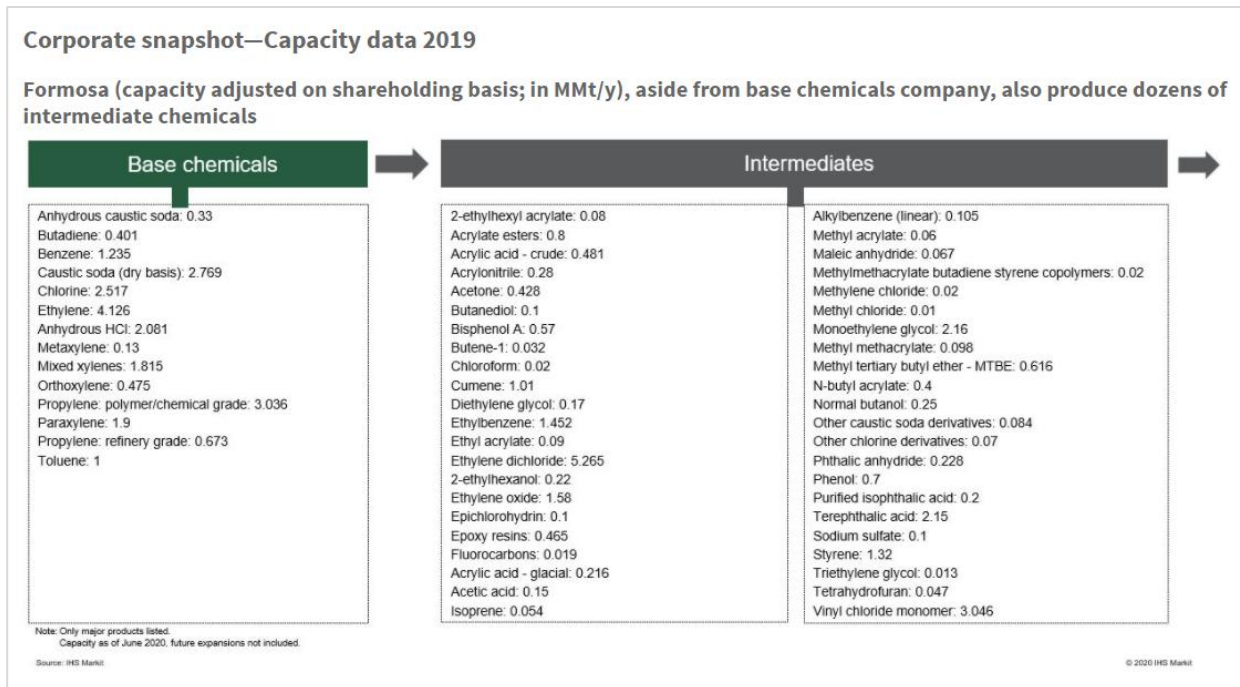
Compounding these financial issues, the project has encountered unanticipated regulatory problems over the last year that stem from existing levels of pollution resulting from decades of industrial development in St. James Parish. The regulatory issues have heightened the likelihood of increased costs. The project is also being challenged on the grounds of environmental racism because of the plan to locate it in a community with a predominantly Black population that already suffers from heavy amounts of toxic pollution due to decades of industrial development.

**The accumulation of risk factors has upended the original investment thesis for the Formosa project.**

The accumulation of risk factors has upended the original investment thesis for the Formosa project. Moreover, even if the complex is built, it is highly likely to face vigorous and protracted opposition to the pollution from its operations.

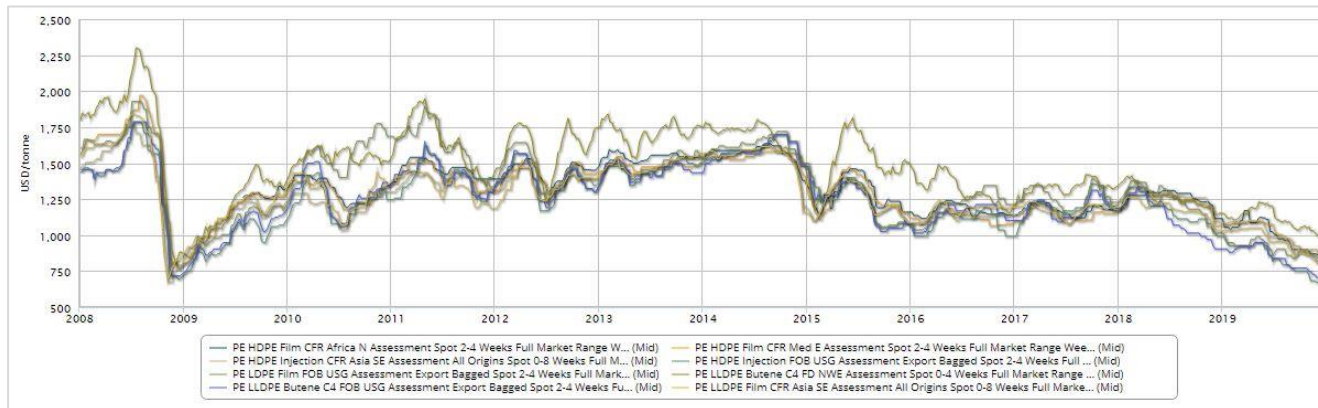
The Formosa plant is the wrong project for the company, the petrochemical markets, the St. James community, the state of Louisiana, and the countries of Taiwan and the United States.

## Appendix I: Formosa Corporate and Financial Overview



Source: IHS Markit.

## Appendix II: Selected Petrochemical Pricing History: 2008-2020



Source: [ICIS](#)

## 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](http://www.ieefa.org)

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