Arkema: Chronic and Acute Climate Risks in 2022

August 31, 2017, Flooding at Arkema's Houston Plant After Fire Outbreak

Summary

In 2022, a client requested that Responsible Alpha develop 12 case studies and the underlying business, economic, and investment analysis used by 123 environmental, indigenous rights, and racial justice organizations in their letter to the Honorable Gary Gensler, Chair, U.S. Securities and Exchange Commission on the proposed rule "The Enhancement and Standardization of Climate-Related Disclosures for Investors."

Responsible Alpha's analysis suggests investors need companies to disclose their climate-related financial risks and strategies for managing them, their greenhouse gas (GHG) emissions, their plans to remain viable or thrive in a low-carbon future economy, and their financial resilience across these dimensions, as it relates to and is in support of the communities where these companies exist, and their impacts are often felt and underreported. To further buttress and

support this analysis, Responsible Alpha wrote 12 business cases of which the case below on Arkema is one.

Arkema, $9.2 billion market capitalization, $4.7 billion in fixed income securities, 20,000 employees, is a leading producer of specialty and commodity plastics in the U.S. Arkema has a plastics production facility that was damaged during and after Hurricane Harvey.

Note: In the U.S. property taxes paid by corporations and individuals are a large source of the funding for municipal (e.g., county and parish) level services. These property tax-funded services include schools, libraries, health and emergency services, parks and recreation, water management including levees, drainage and climate resilience, and fire and law enforcement.

This occurred when the Arkema La Porte (Houston), Texas plant caught fire after Hurricane Harvey hit it on August 31, 2017, with detrimental health impacts for fence line communities and first responders. The plant produces many key chemicals used in plastics production. The fires resulted in dioxins and many other dangerous toxic pollutants flooding into and destroying neighborhood homes.

Arkema refused to provide chemical inventory or maps to the public. Many of the Tier II chemicals and related chemical inventories produced by Arkema at the facility remain secret.

The August 31, 2017, explosion was preventable if Arkema had properly incorporated storm surge, flood risk and other physical risks from climate change into its approach to risk management.

In 2016, the Process Safety Center at Texas A&M University in College Station, Texas assessed more than 2,500 chemical facilities in the Houston area for injury, fatality, and emergency preparedness risks. The Houston Chronicle then showed that the Arkema facility ranked 22 out of the 2,500 chemical facilities for highly reactive (dangerous) chemicals, putting the community on notice that the Arkema lacked adequate risk management processes and emergency planning in place.

In 2011, Arkema entered into an agreement with La Porte (Texas) Independent School District (ISD) to decrease Arkema's property taxes payable to the school district at the time of approval to an assessed property value of USD 30 million in return for Arkema supporting economic growth in the region. Arkema promised high-paying jobs instead of paying its full share of property taxes. But from 2015 to 2020, Arkema reported only generating five total qualifying jobs at annual wages USD 65,000, slightly above the region's baseline of USD 52,392 with total property tax value exemptions equal to USD 8,444,310.

Arkema took advantage of the Texas Economic Development Act, called Chapter 313, which allows school districts in Texas to limit the appraised value of property over ten years to attract industries. This feature reduces the chosen industry's property taxes. In return, the school district and chosen industry work out fees to be paid directly to the school district. This program has saved companies more than $10 billion in taxes over the 10-year agreement period. Like the current ITEP, Chapter 313 involves a reduction of property taxes and district-level control as well. However, the reimbursement mechanism of Chapter 313, which requires industry to pay school districts directly, removes those funds from the larger

"pot" of statewide school funding. Critics of this program say that this often leaves poorer school systems to the wayside.

During the May 2021Texas legislative session, the House rejected a bill to renew and expand Chapter 313, which will expire in December of 2022.

Texas Economic Development Act (Chapter 313 of the state's tax code) allows school districts to limit appraised property tax value if facilities support job creation. But one-third of Texas school districts lost more than $1,000 per pupil annually due to this corporate tax break.

This case study focuses on the costs to the community of Arkema's operations, and in particular, the Independent School District (ISD) of La Porte, Texas. The La Porte ISD is partially funded via property taxes derived from industrial facilities. These facilities can apply for a property tax cap under State of Texas Chapter 313.

In 2011, Arkema sought and gained approval from the La Porte ISD for a property tax cap of $30 million on its facility, if the facility provided a small number of jobs that were above regional averages.

For example, the following are the property taxes capped for Arkema's facility:

- 2015: $3,624,860
- 2016: $0
- 2017: $0
- 2018: $619,000
- 2019: $801,810
- 2020: $3,398,640

Thus, Arkema decreased its property tax valuation over these six years before, during, and after Hurricane Harvey by more than $8 million dollars, leaving the community with both a legacy of toxic chemicals, and an underfunded La Porte ISD.

About the U.S. Plastics Industry

The U.S. plastics industry, concentrated along the coasts of Texas and Louisiana, has a toxic throw-away business model that matches its toxic throw away products – single-use plastic used in bottles, wrap, film, clothes and other products. The people who live in fenceline communities, the schools that educate their children, the air they breathe, and the land and water that surrounds them are all just resources to use up and throw away. Cynically, even the plastic plants are throw-away assets, soon to be stranded by the storm surge and sea level rise caused in part by the carbon emissions of the plants.

In an ironic twist of environmental injustice, these U.S. petrochemical companies that produce plastics resins do not pay their fair share of property taxes, burdening communities and residents along Texas and Louisiana's Plastics Production Corridor with underfunded schools and municipal services. This tax dodge compounds the severe environmental, pollution and climate risks. The facilities are linked to

pollution and nurdle spills, toxic chemical releases that imperil the health of residents at their fence line, and carbon emissions that imperil the planet.

Responsible Alpha's analysis of data provided by Bloomberg shows that 84 percent of U.S. overall capacity (see Table 1) of these chemicals is concentrated in just 22 out of 3,220 counties in the U.S. called the Chemical Coast.

The Chemical Coast, along the Gulf Coast of Texas and Louisiana, is where 84 percent of U.S. plastics production, across the sector's supply chain

The Chemical Coast is also particularly prone to the chronic and acute risks from climate change due to sea-level rise, storm surge, extreme weather, and inundation of land.

Company Overview

Arkema manufactures and markets a wide range of chemicals including both industrial chemicals and performance products including acrylics, polymethyl methacrylate (PMMA), hydrogen peroxide, technical polymers, specialty chemicals, and functional additives. Arkema also manufactures specialty chemicals and high-performance materials like polymers and additives, industrial specialty products like fluorochemicals and hydrogen peroxide, as well as coating resins and plastic additives. Arkema's about 145 production sites are spread across Europe, North America, and Asia.

The company is especially focused on bio-based products, lightweight materials, water management, electronics solutions, and home efficiency and insulation. Its branded polymer products include PEKK, Orgasol, and Pebax. Majority of sales were generated from Europe. Geographically, around 35 percent of annual sales is generated in Europe, followed by North America (over 30 percent) and Asia (about 30 percent). Arkema has some 145 production sites in some 55 countries. With some 15 R&D sites and approximately 1,600 researchers. Arkema is headquartered in France.

Climate Risks

In 2020, Arkema's announced its climate plan in line with the Paris Agreement: GhG – 38% less in absolute terms compared with 2015. Details are:

- "By 2030, 38% reduction in the absolute value of greenhouse gas emissions* compared with 2015. * Scope 1 and Scope 2 as defined in the Kyoto Protocol + substances listed in the Montreal Protocol.
- By 2030, 19% reduction compared with 2015 levels in absolute emissions related to fuel and energy (excluding Scopes 1 and 2), waste produced, and upstream and downstream transportation and distribution."
- "Scope 3 greenhouse gas emissions as defined in the Kyoto Protocol:
    - by 2030, 19% reduction compared with 2015 levels in absolute emissions related to fuel and energy (excluding Scopes 1 and 2), waste produced, and upstream and downstream transportation and distribution.

- commitment that raw materials suppliers representing 82% of GHG emissions related to our purchases set Science-Based Targets (SBTs) on their Scopes 1 and 2 by 2025."

Arkema then tested their global portfolio of facilities for climate risks reviewing "Extreme climate-related rainfall was assessed under the RCP 2.6 and RCP 8.5 scenarios. The analysis shows that climate-related flood risks are limited for Group sites in the short term."

Community Risks

Throughout plastics' full life cycle, plastics and their associated chemicals present potential risks to human health. Many toxic chemicals are released during the chemical engineering process to produce plastics, and during plastics' use and waste management stages. During the fossil fuel extraction process to mine the hydrocarbons used in plastic production, dangerous pollutants including sulfur oxides, nitrogen oxides, volatile organic compounds, chlorinated and other toxic organic chemicals are released.

Toxic chemicals often are also released during plastic production that include chemicals such as benzene, which is a known human carcinogen. Other toxic chemicals released during production can cause negative health impacts such as endocrine disruption, asthmas, diabetes, and many other detrimental impacts to human health.

Arkema's facility was named one as one of the worst facilities in 2015 in research conducted by the Houston Chronicle. The facility was fined $91,274 for 10 safety violations alone in 2017. The key risk that was not mitigated were the 19.5 tons of organic peroxides that require constant cooling, or they will ignite. These are key ingredients that catalyze the plastics consumed each day. Yet, just like in Fukushima where flood waters damaged generators, a similar thing happened to the Arkema facility, and the facility blew up, injuring first responders and spewing dangerous chemicals into the residential community. Subsequently, a criminal investigation was initiated resulting in a grand jury indicting Arkema North America one year later.

A Texas judge tossed out the case October 1, 2020.

Environmental Risks

The location where the Arkema facility sits suffers from acute and chronic climate risks. Hurricane Harvey demonstrated these risks as Arkema's executives admitted they were not prepared, nor did they discuss these issues in their regulatory filings. Arkema's 43-year-old plant provided dramatic images of the impacts from acute and chronic climate risks due to Hurricane Harvey. The Center for Biological Diversity in Tucson, Arizona, "showed that the Houston area's hundreds of refineries and petrochemical operations released almost 1 million pounds of air pollutants in Harvey-related spills and flares, including benzene, sulfur dioxide, toluene, and xylene. The effects might not be known for months."

Figure 1: Smoke rises from the chemical plant in Crosby, near Houston, Sept. 1, 2017.

Risks Facing Arkema

- The Arkema facility generates about $30 million in annual revenue for the French multinational. This is less than 1 percent of Arkema's overall annual revenue.
- Arkema had to pay legal fees and facility maintenance fees.

Risks Facing Investors and Lenders

- Some reputational risks occurred yet there are no specific material impacts to investors.

Annex

Table 1: U.S. plastic production, 2019 capacity. Sources: Bloomberg Finance L.P., NexantECA data accessed via Bloomberg Finance L.P. Acronyms are dimethyl terephthalate (DMT), ethylene dichloride (EDC), propylene oxide (PO), purified terephthalate acid (PTA), vinyl chloride monomer (VCM), acrylonitrile butadiene styrene (ABS), expandable polystyrene (EPS), high density polyethylene (HDPE), low density polyethylene (LDPE), linear low-density polyethylene (LLDPE), polyethylene terephthalate (PET), polyvinyl chloride (PVC) and styrene butadiene rubber (SBR).

Chemical Type	Chemical Category	Plastics Supply Chain	Capacity 2019 (kt)	# Lines	Texas and Louisiana coast (kt)	Texas and Louisiana coast % US Capacity
2-Ethylhexanol	Basic	Chlor-Alkali & Vinyls	508	2	260	51%
Benzene	Basic	Aromatics	8,059	34	6,188	77%
Butadiene	Basic	Olefins/polyolefins	2,376	10	2,376	100%
Ethylene	Basic	Olefins/polyolefins	35,047	38	33,266	95%
Methanol	Basic	Syngas/Methanol	7,452	7	7,192	97%
Mixed-Xylene	Basic	Aromatics	8,092	22	6,317	78%
Paraxylenes	Basic	Aromatics	2,859	5	1,759	62%
Propylene	Basic	Olefins/polyolefins	15,158	50	13,426	89%
Acrylic Acid	Intermediate	Olefins/polyolefins	1,280	5	1,280	100%
Acrylonitrile	Intermediate	Olefins/polyolefins	1,349	4	1,149	85%
Cumene	Intermediate	Aromatics	3,154	6	2,509	80%
Cyclohexane	Intermediate	Aromatics	1,609	8	1,491	93%
DMT	Intermediate	Aromatics	249	1	0	0%
EDC	Intermediate	Chlor-Alkali & Vinyls	15,343	13	14,342	93%
Ethylene Oxide	Intermediate	Olefins/polyolefins	4,271	14	4,119	96%
iso-Butanol	Intermediate	Olefins/polyolefins	160	6	92	57%
Isopropanol	Intermediate	Solvents	830	4	830	100%
MEG	Intermediate	Aromatics	3,193	11	3,089	97%
n-Butanol	Intermediate	Solvents	1,121	7	989	88%
Phenol	Intermediate	Aromatics	2,329	7	645	28%
Polybutadiene	Intermediate	Aromatics	742	6	675	91%
PO	Intermediate	Olefins/polyolefins	2,346	5	2,346	100%
PTA	Intermediate	Aromatics	3,024	4	0	0%
Styrene	Intermediate	Aromatics	4,985	6	4,985	100%
VCM	Intermediate	Chlor-Alkali & Vinyls	9,036	12	8,437	93%
ABS	Resin	Aromatics	675	5	0	0%
EPS	Resin	Aromatics	390	4	0	0%
HDPE	Resin	Olefins/polyolefins	9,005	30	8,770	97%
LDPE	Resin	Olefins/polyolefins	3,648	14	2,858	78%
LLDPE	Resin	Olefins/polyolefins	7,674	18	7,184	94%
PET Bottle Grade	Resin	Aromatics	3,459	10	0	0%
Polypropylene	Resin	Olefins/polyolefins	7,856	17	0	80%
Polystyrene	Resin	Aromatics	2,146	11	6,267	32%
PVC	Resin	Chlor-Alkali & Vinyls	7,905	19	6,525	83%
SBR	Resin	Olefins/polyolefins	863	6	763	88%
Grand Total			**178,192**	**422**	**150,808**	**85%**