Plastics: The Last Straw for Big Oil?

AN INVESTOR BRIEF ON THE RISKS OF OVERINVESTMENT IN PETROCHEMICALS

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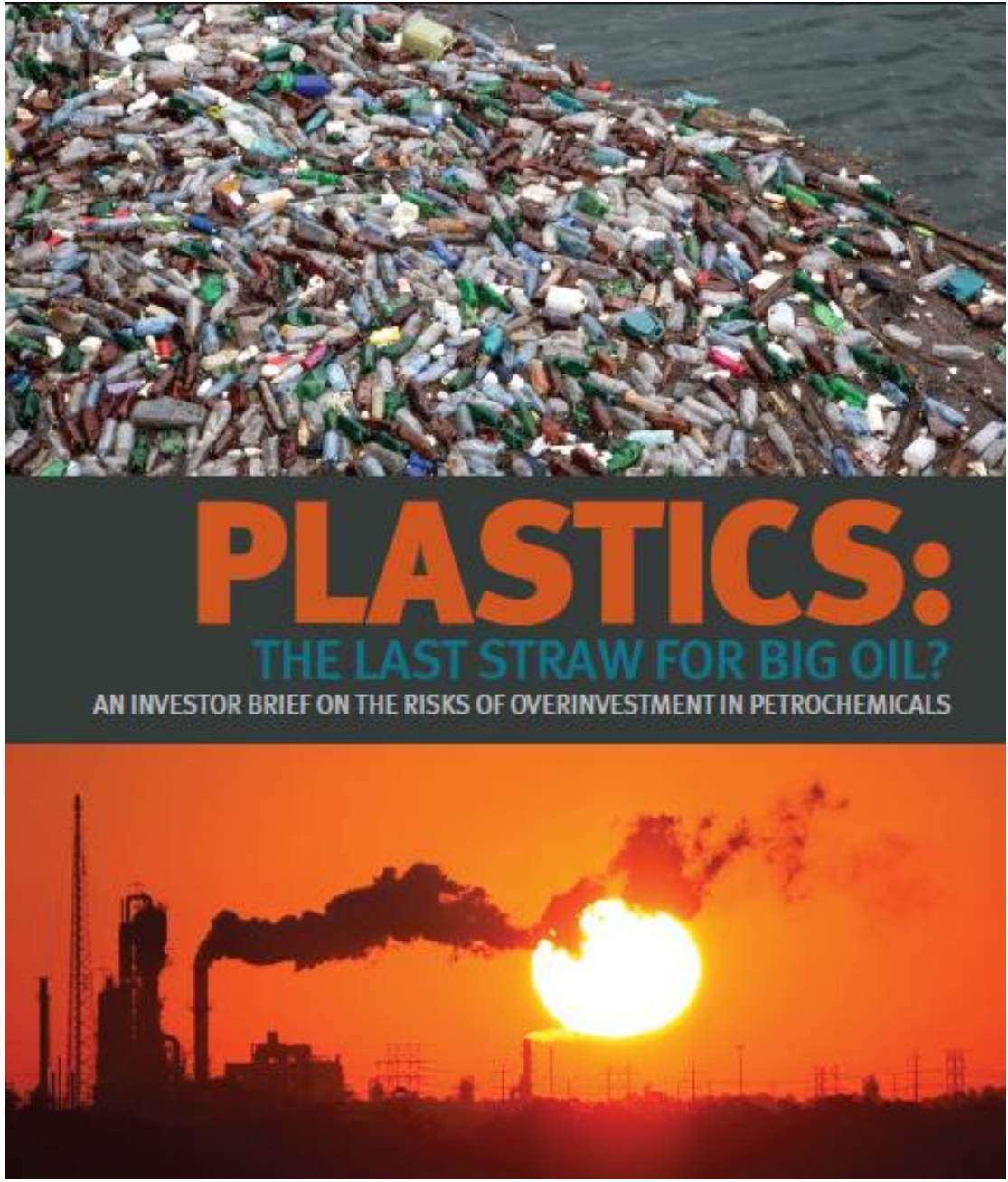
Agenda

- Agenda Overview & Webinar Logistics (3 min)
- Introduction & Report Overview (15 min)
- Panelist Opening Remarks (15 min)
- Moderated Panel Discussion / Q&A (25 min)
- Wrap Up (2 min)
- Virtual After Party on Gather (30 min)



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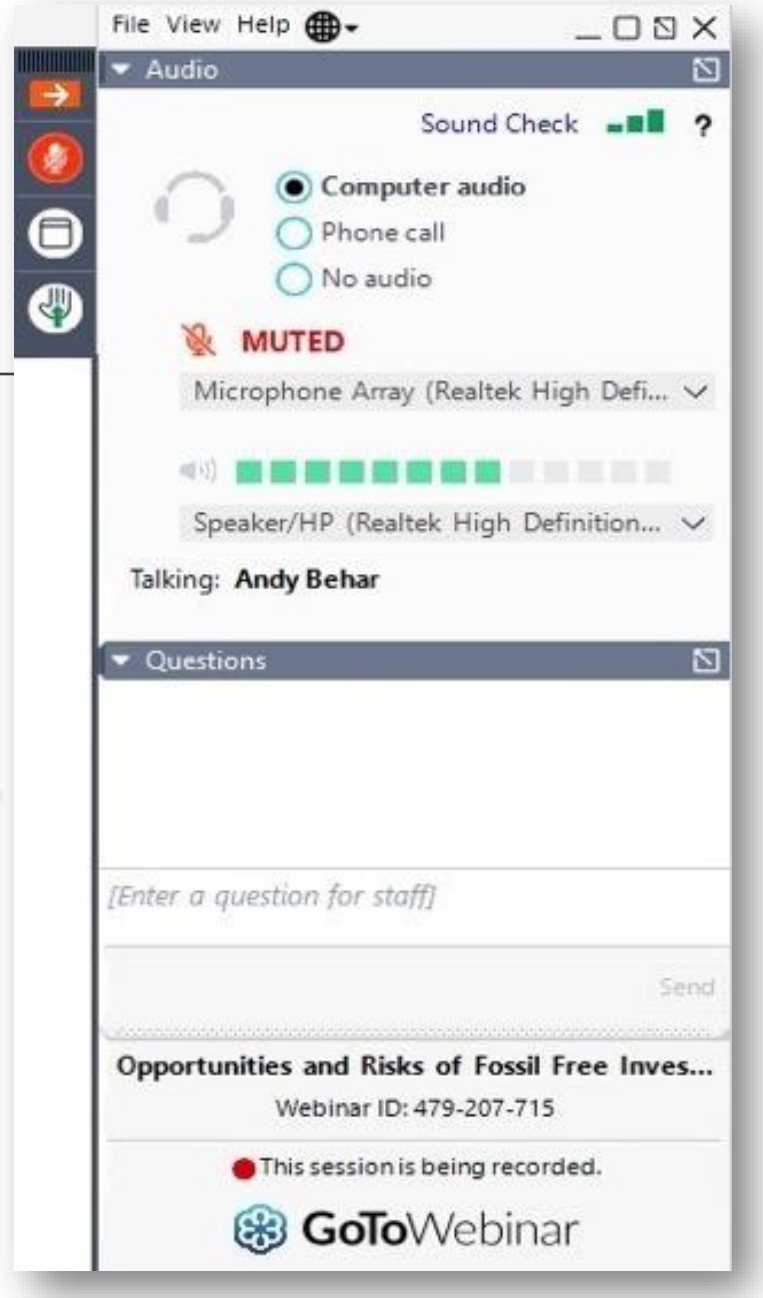

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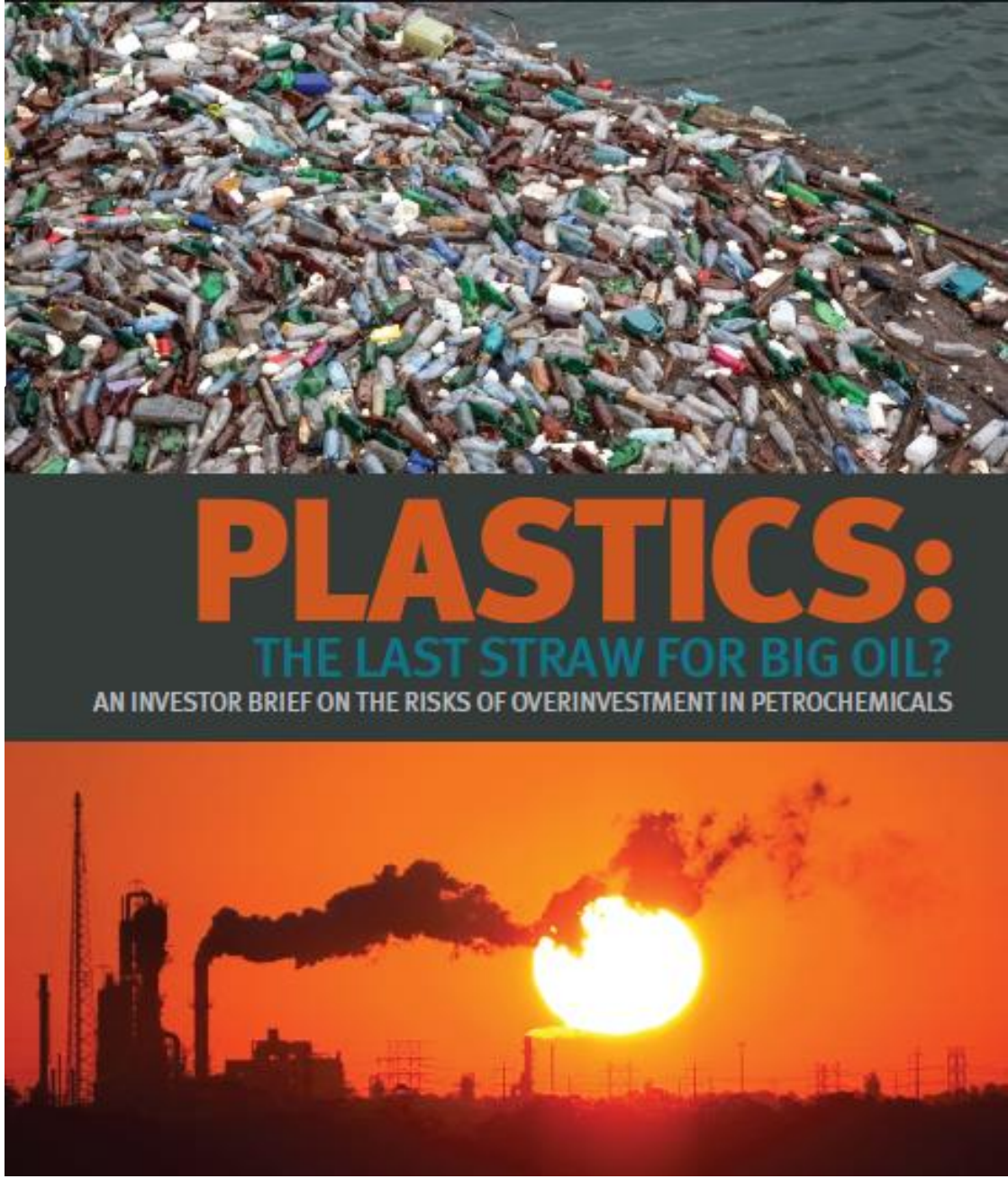
Report Presentation

Lila Holzman
Senior Energy Program Manager
As You Sow



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Report Intent and Goals

- Inform investors and other stakeholders about the increasing role of petrochemicals – especially plastics – in future demand for oil
- Discuss the financial and ESG risks associated with increased plastic and petrochemical production and why they require increased scrutiny
- Provide benchmark questions and best practice examples as a starting point to promote more robust investor engagement and risk assessment

Now is a key moment to clarify what is at stake

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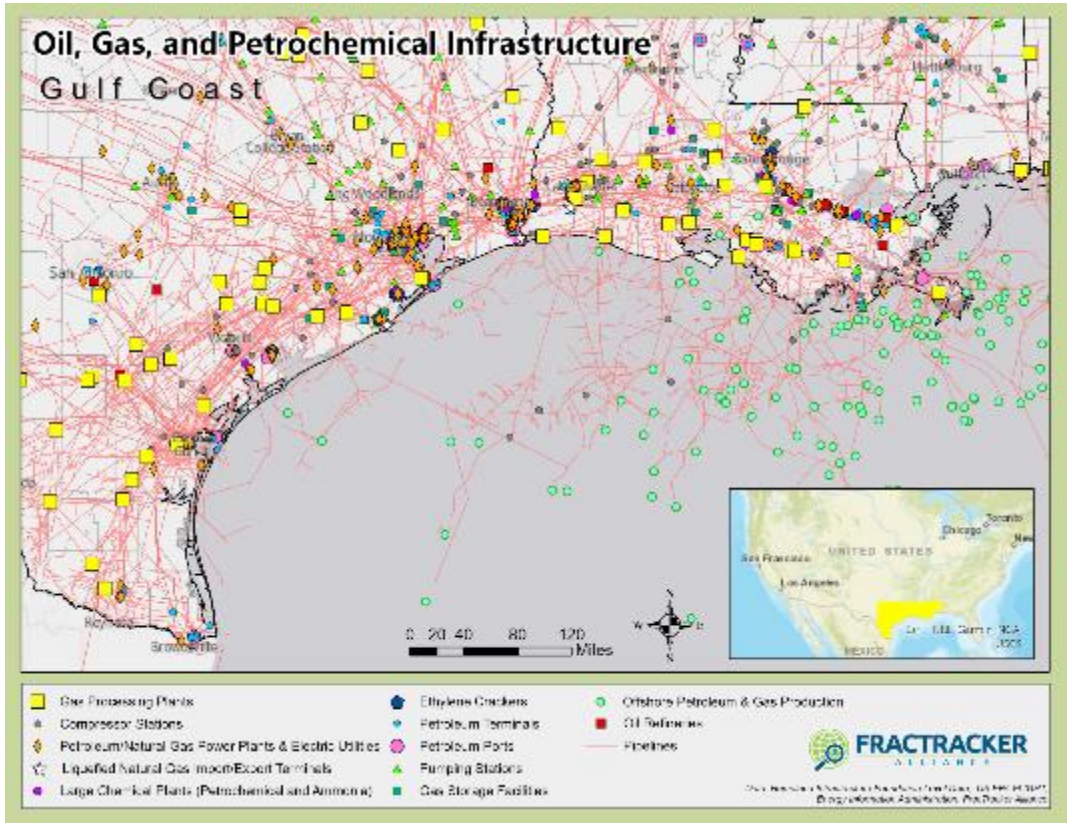
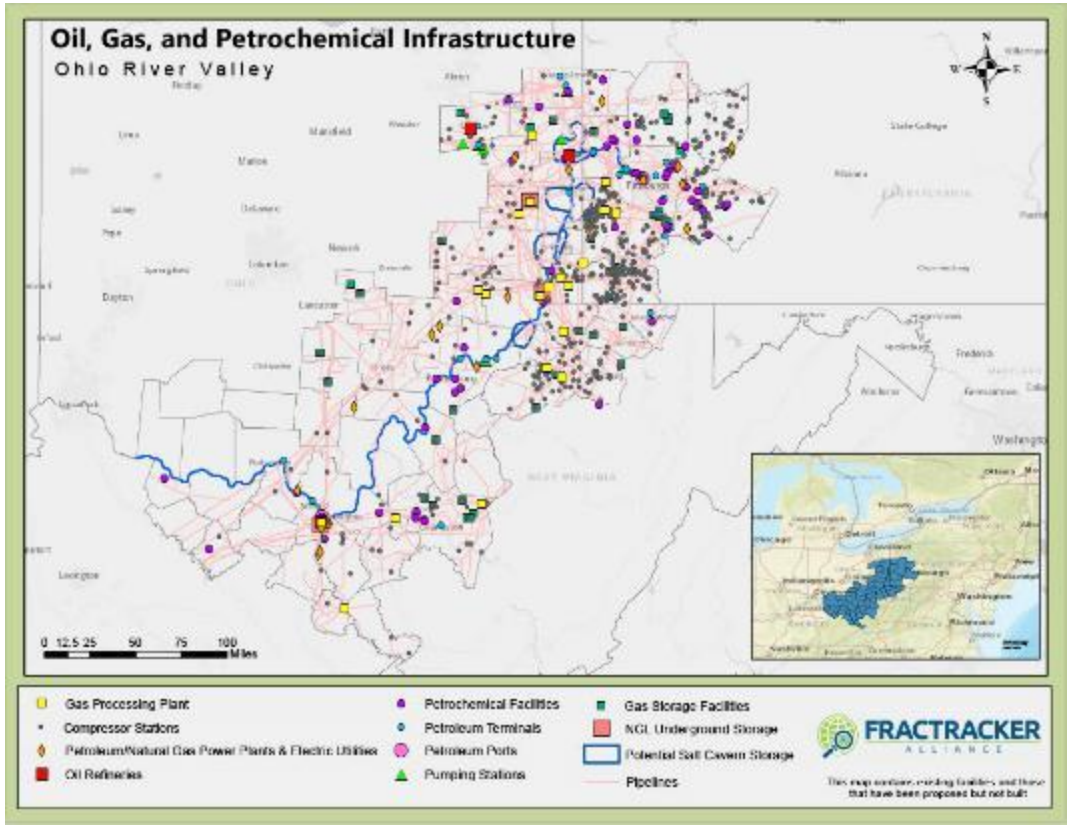
U.S. Petrochemical Buildout– Two Hubs





SOURCE: FracTracker Alliance, "National Energy and Petrochemical Map,"

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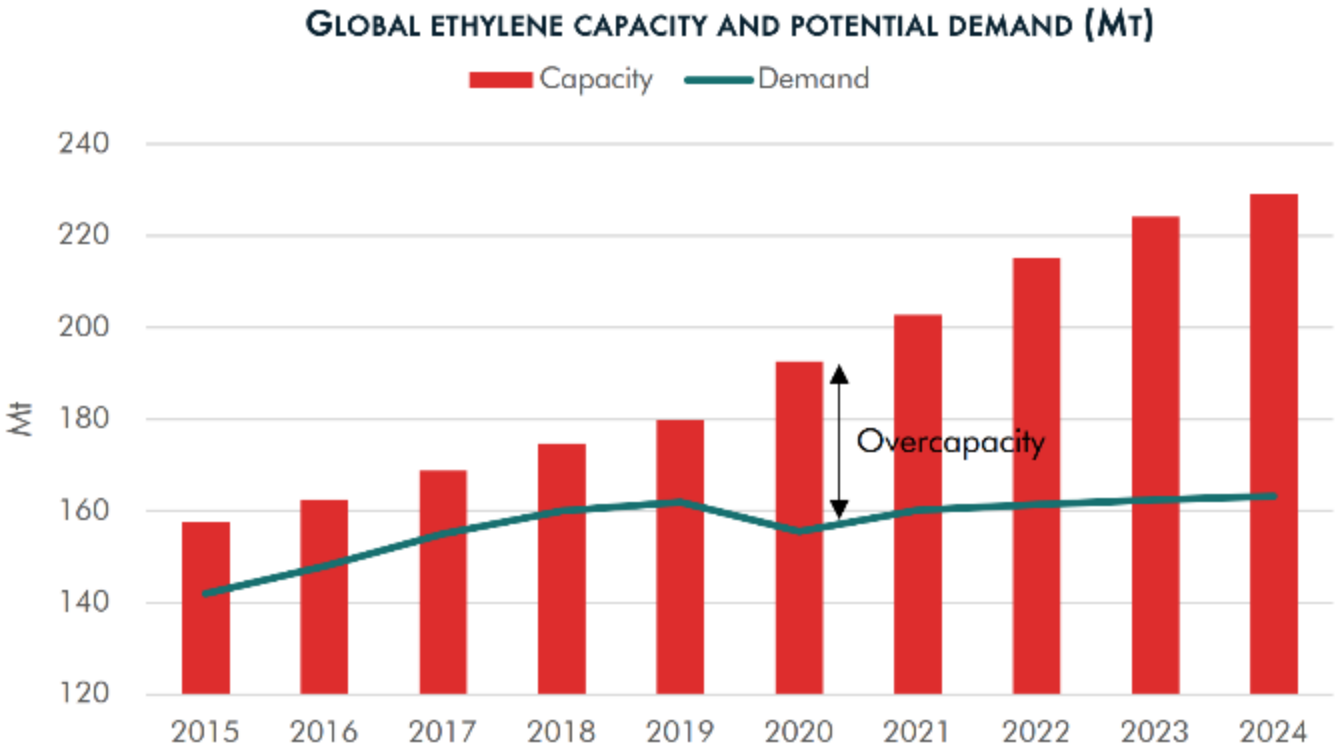
Shifting Economics

- Gulf Coast Ethylene Margin ($/tonne):
  - 2014: $558
  - 2020: $127
  - 2022: $50
- Demand in Question
  - OECD demand saturated
  - Single-use plastic consumption in Global South may fall short of expectations
- Additional plastic production at risk of becoming stranded:
  - $56 billion in U.S.
  - $400 billion globally



Source: Wood Mackenzie, Nexant via Bloomberg, "Breaking the Plastic Wave", Carbon Tracker

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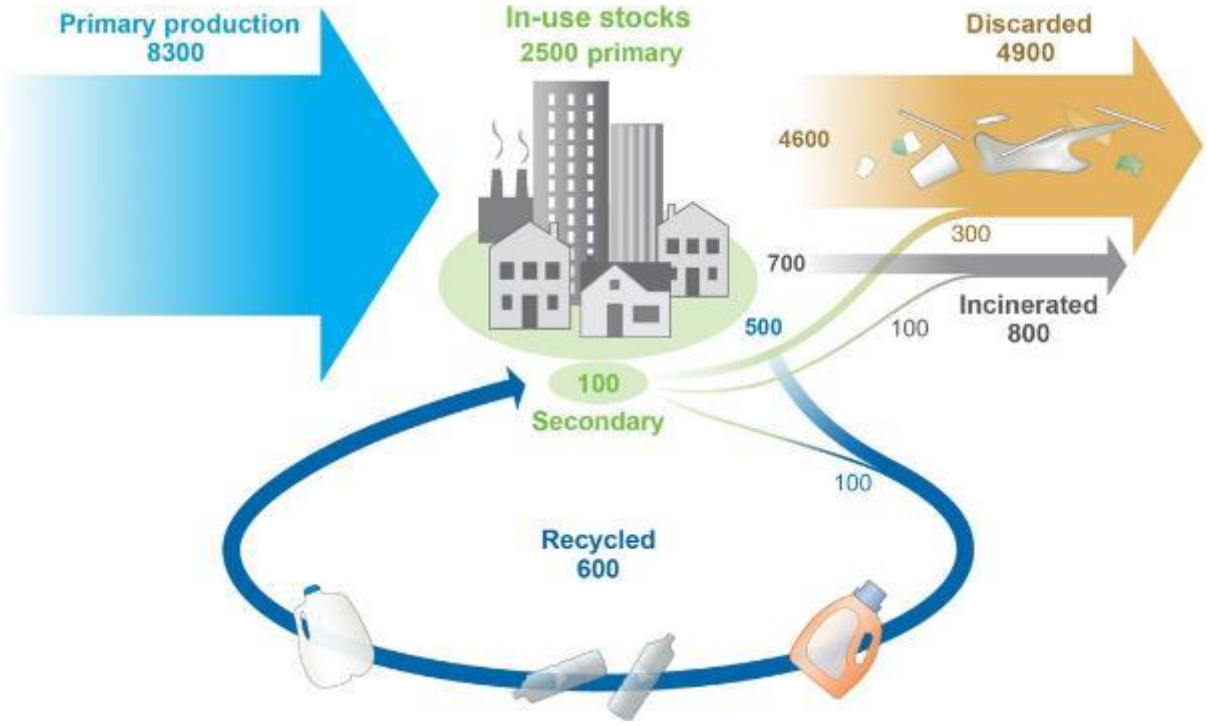
The Plastic Production Problem

- 6.3 billion tonnes of plastic disposed of globally between 1950 and 2015
  - 9% recycled once
  - 1% more than once
- Global recycling rate at 14% in 2016 (less than 10% in the US)
- In 2016, the world mismanaged 41% of its plastic waste. If the status quo continues, this will grow to 56% by 2040. (Mismanaged: leaked into dumpsites on land, released into oceans, and open burned).

Global Production, Use, and Fate of Polymer Resins, Synthetic Fibers, and Additives (1950 to 2015; in million tonnes)



SOURCE: Roland Geyer, Jenna R. Jambeck, and Kara Lavender Law , "Production, Use, and Fate of All Plastics Ever Made," *Science Advances* 3, no. 7 (July 2017): e1700782, https://doi.org/10.1126/sciadv.1700782.

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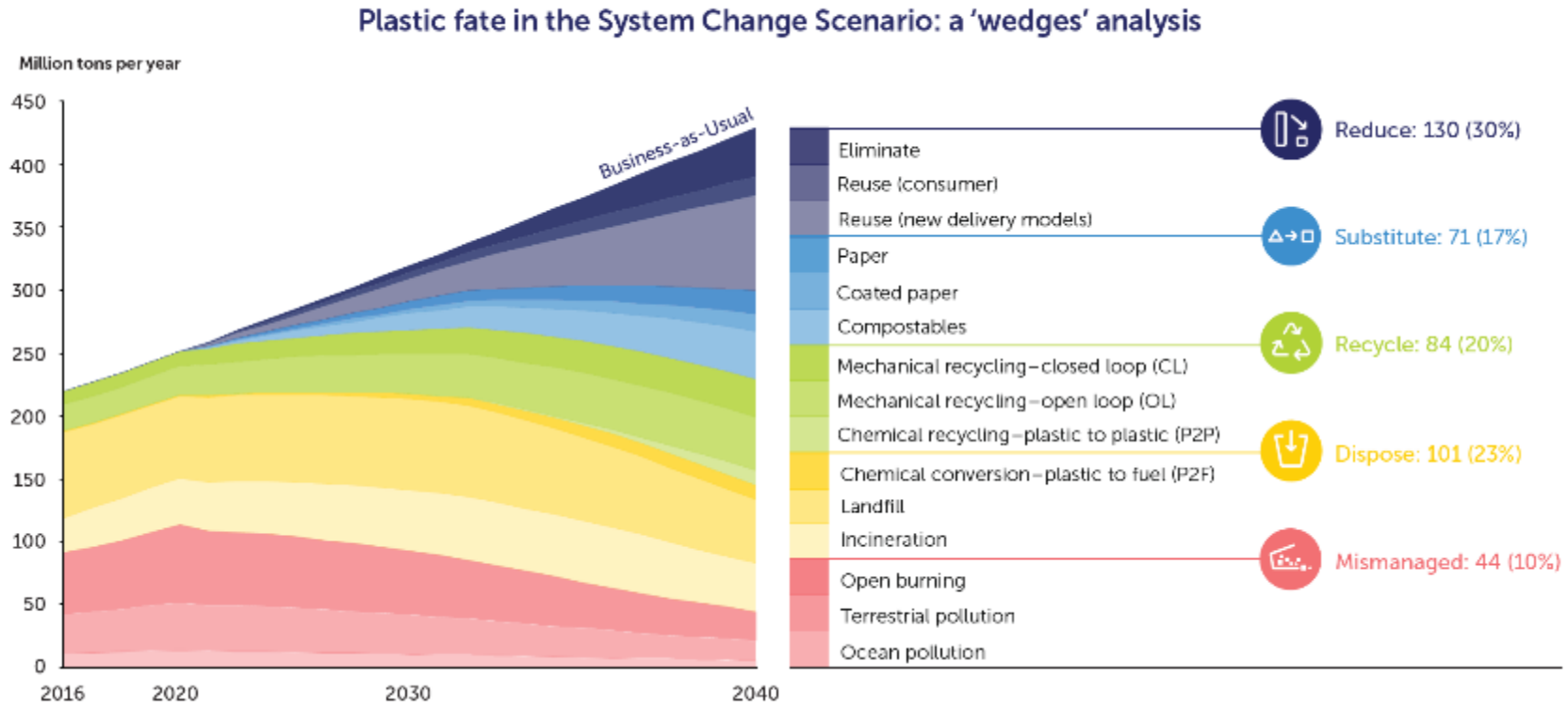
A Circular Economy for Plastics

- No silver bullet
- Plastic reduction, substitution, and reuse will play the largest role
- Momentum is growing to curb plastic consumption
- Technologies like bioplastics or "advanced" recycling are needed, but concerns on limitations



SOURCE: Pew Charitable Trusts and SYSTEMIQ, *Breaking the Plastic Wave: A Comprehensive Assessment of Pathways Towards Stopping Ocean Plastic Pollution*, 2020, https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_report.pdf.

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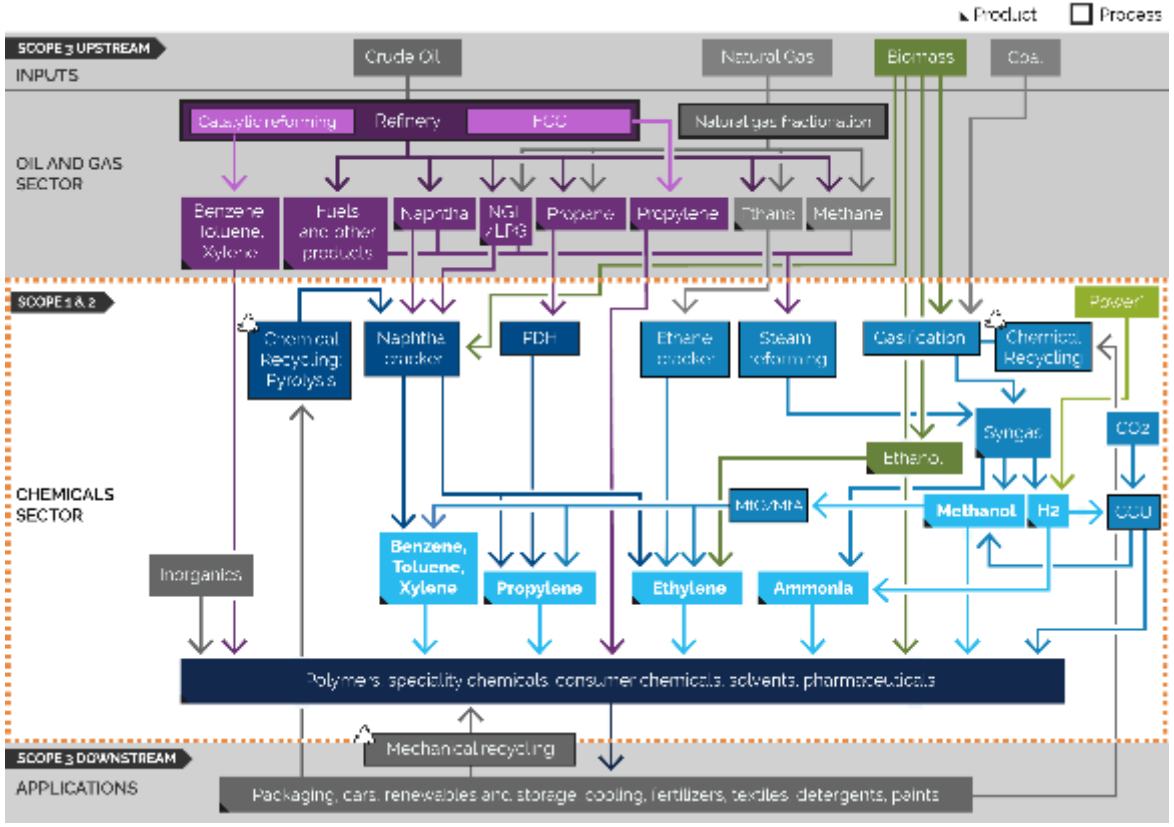
Petrochemicals and the Climate Crisis

- BAU growth of plastics alone may account for 19% of the remaining carbon budget by 2040
- Significant GHG emissions occur throughout the plastic lifecycle, with 61% from resin production, 30% from resin-to-product conversion, and 9% from end-of-life
- Emission boundaries across oil and gas and petrochemical sectors are complex
- Complexity will grow as more investments are made into chemical recycling and plastic production



SOURCE: Science Based Targets, *Barriers, Challenges, and Opportunities for Chemical Companies to Set Science-Based Targets*, 2020, https://sciencebasedtargets.org/resources/files/SBTi-Chemicals-Scoping-Document-12.2020.pdf.

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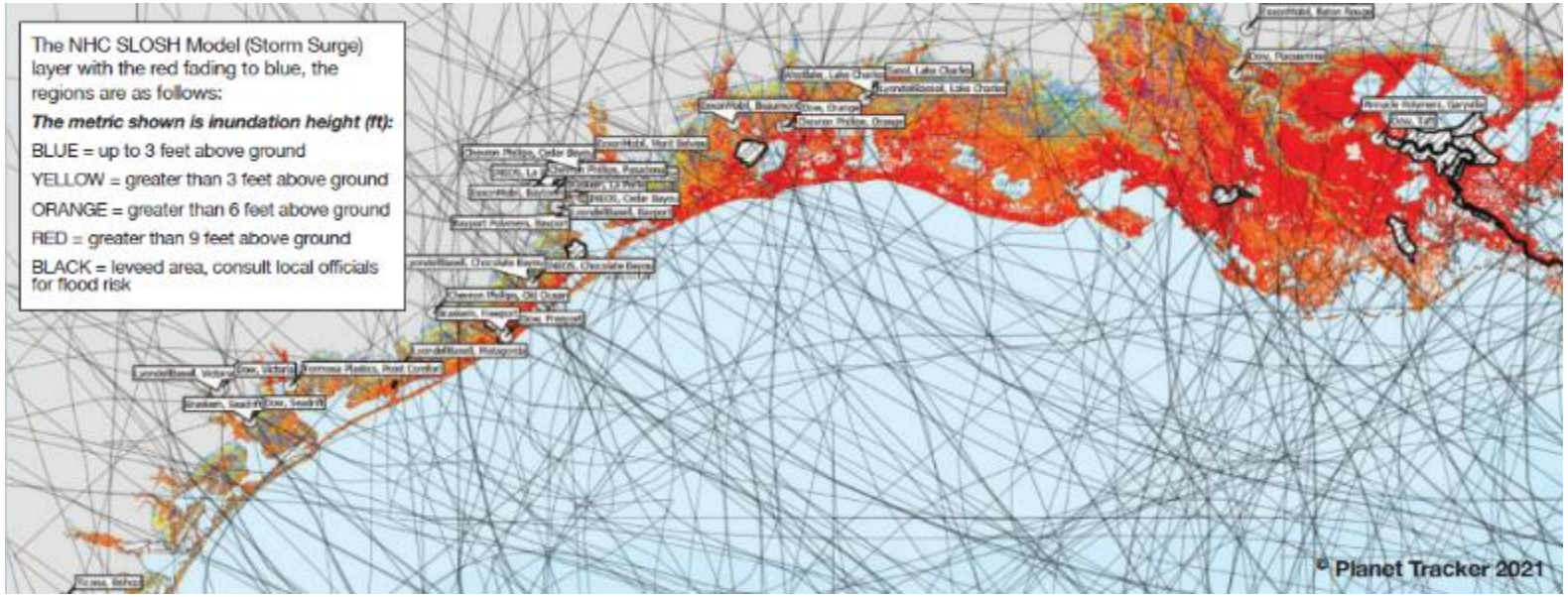
Petrochemicals and the Climate Crisis

- Much petrochemical build out is occurring in the Gulf Coast, which is increasingly vulnerable to physical climate risks

Storm Surge Risk Using SLOSH Model for the Plastic Production Corridor



SOURCE: Planet Tracker, *Stormy Outlook for US Plastics Refiners: Risk of Stranded Assets in the Gulf of Mexico*, Resins Briefing Paper (November 2020), https://planet-tracker.org/tracker-programmes/materials/plastics/#stormy-outlook

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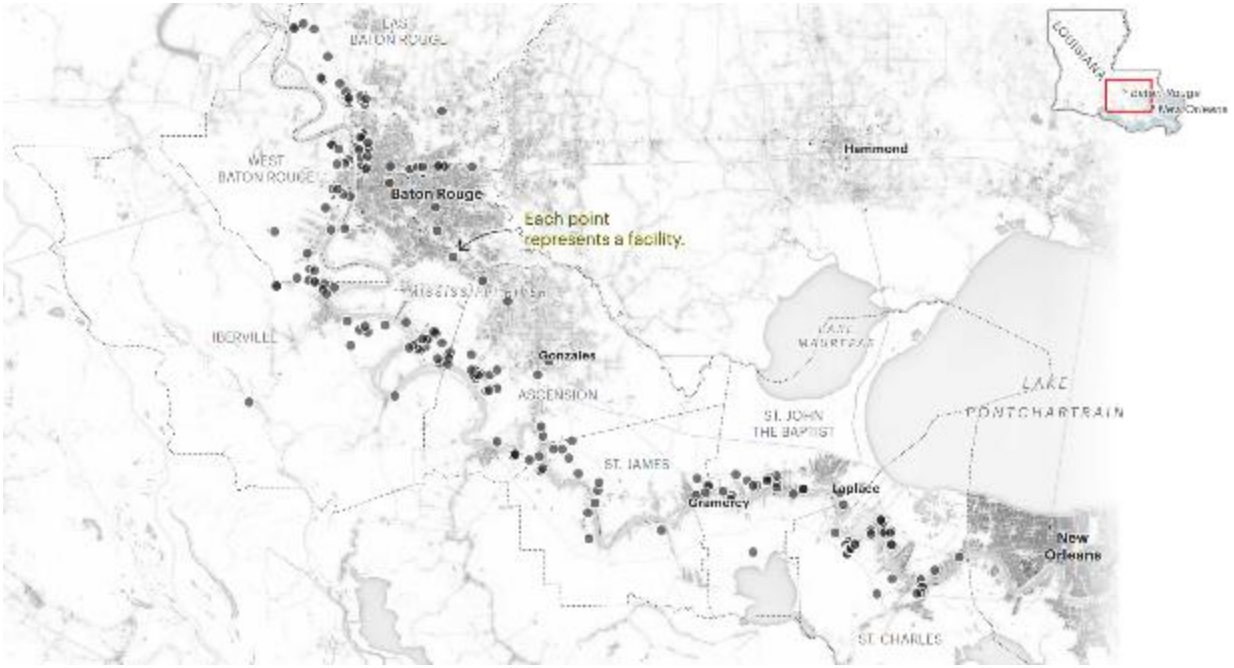
Health, Environmental Justice, and Increasing Opposition

- Petrochemical operations emit dangerous chemicals with negative health impacts
- Emissions often surpass permitted levels, and aggregated impacts have led to the creation of "Cancer Alley" – an area of Louisiana with near proximity to over 200 petrochemical facilities
- People of color are twice as likely to live within a fence-line zone of a petrochemical facility as white people
- Industry's plans to continue development of petrochemical activities in Black and low-income communities face growing opposition and legal challenges from grassroots organizations and community groups

Petrochemical Facilities in "Cancer Alley"



Screenshot taken from: Lylla Younes, Al Shaw and Claire Perlman, "In a Notoriously Polluted Area of the Country, Massive New Chemical Plants Are Still Moving In," October 30, 2019, https://projects.propublica.org/louisiana-toxic-air/.

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Conclusions

- This report identifies serious concerns regarding planned expansion of petrochemicals, especially plastics
- These issues are evolving and growing in importance
- Investors and other stakeholders can use the overview provided in this report as well as the benchmark questions found in each section as a starting point to push for better clarity and accountability

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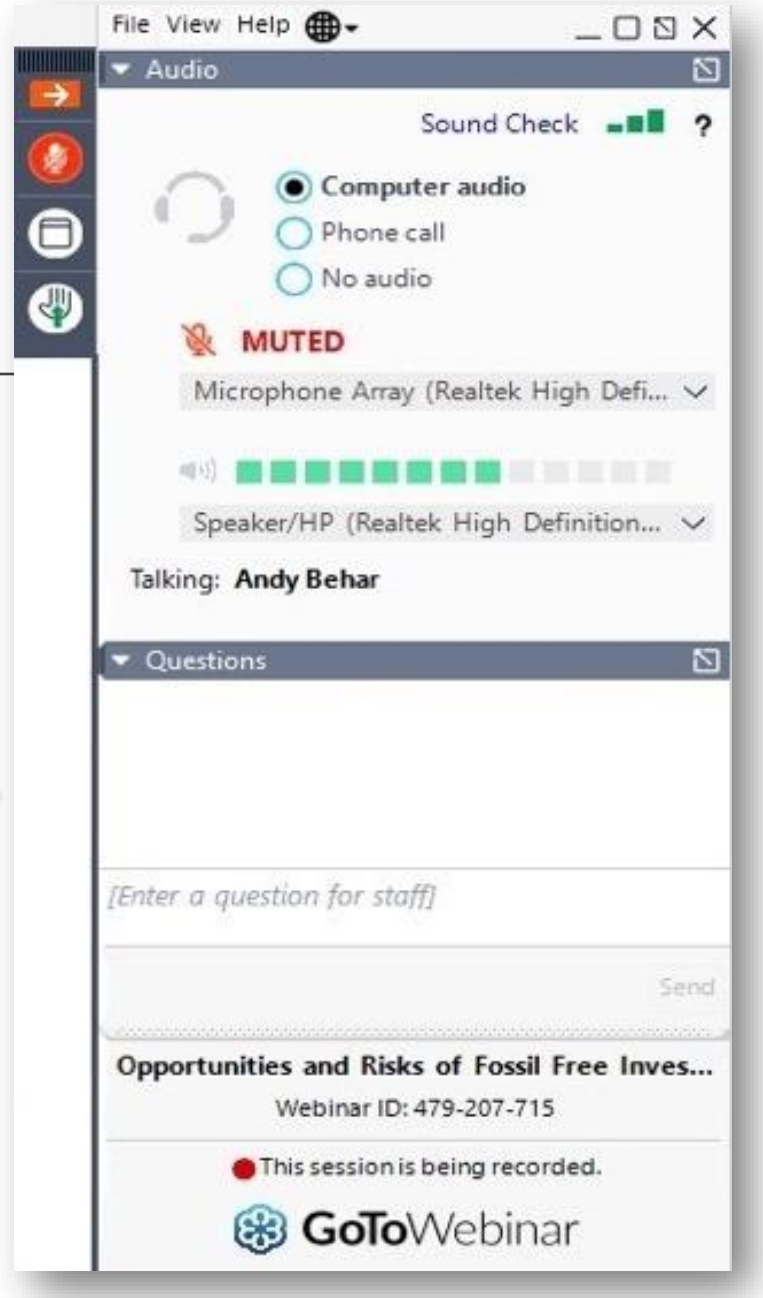

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Featured Speakers

Horace Chan
Energy and Chemicals Senior Industry Analyst
Bloomberg Intelligence

Conrad MacKerron
Senior Vice President
As You Sow

Anne Rolfes
Director
Louisiana Bucket Brigade

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Plastic Pollution Problem Growing

- 41% of plastic waste "mismanaged" – leaks to land, oceans, or openly burned
- 11 million tons of plastics swept into oceans annually – rate could triple by 2040
- Less than 10% is recycled
- More plastics than fish in ocean by weight estimated by 2050

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Backlash Against Plastic

- Public concerns about plastic pollution rival climate change in opinion polls
- 170 nations have pledged to "significantly reduce" use of plastics by 2030
- 27 countries have banned some forms of single use plastics
- UN Environment Assembly working toward global treaty limiting plastic pollution

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Business Risks

- Governments could impose $100 billion in fees annually to cover waste management costs (Pew)
- $40 billion in environmental damages linked to plastic packaging - exceeding profits of industry (UN)
- Pew study - Consumer goods sector must cut plastic demand by one-third through elimination, reuse, refill, new delivery systems
- Up to 1 million deaths/yr may be attributable to living near mismanaged plastic waste and pollution

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Companies Taking Action to Reduce Plastic Use

- **McDonald's, Dunkin' Brands** phase out polystyrene cups and containers (2 billion+ cups)
- **Unilever** to eliminate 100,000 tons of plastic packaging
- **Nestlé** to reduce virgin plastic use by one-third (about 560,000 tons) and invest $2 billion in recycled content
- **PepsiCo** to reduce virgin plastic 35% for beverages and set a new TBD goal for rest of its products later in 2021
- **Keurig Dr Pepper** to reduce virgin plastic use by 20% and **Mondelēz International** by 5%.

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The Newspaper for St. James Parish
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Bishop Joins Opposition Groups For *All Saints Day* Ceremony At Gravesite Located On Formosa Property

By K. Wesley White
Contributing Writer

RISE St. James, an organization seeking racial and environmental justice in St. James Parish, commemorated the recently found graves of enslaved people on the property of a former plantation slated to house a $9 billion Formosa plastics plant.

The *All Saints Day* celebration follows a court battle that ensured that descendants have access and could hold Saturday's service at the site of the unmarked graves located in a sugarcane field that had been planted and plowed over for years, RISE founder Sharon Lavigne said.

Bishop Michael Duca blesses the graves of the people buried in the sugarcane field.

tors and the judge ruled in our favor."

Baton Rouge Catholic Bishop Michael Duca lead

ficiated over the service. His coming is a really big deal," Lavigne said. "We are gonna win this!"

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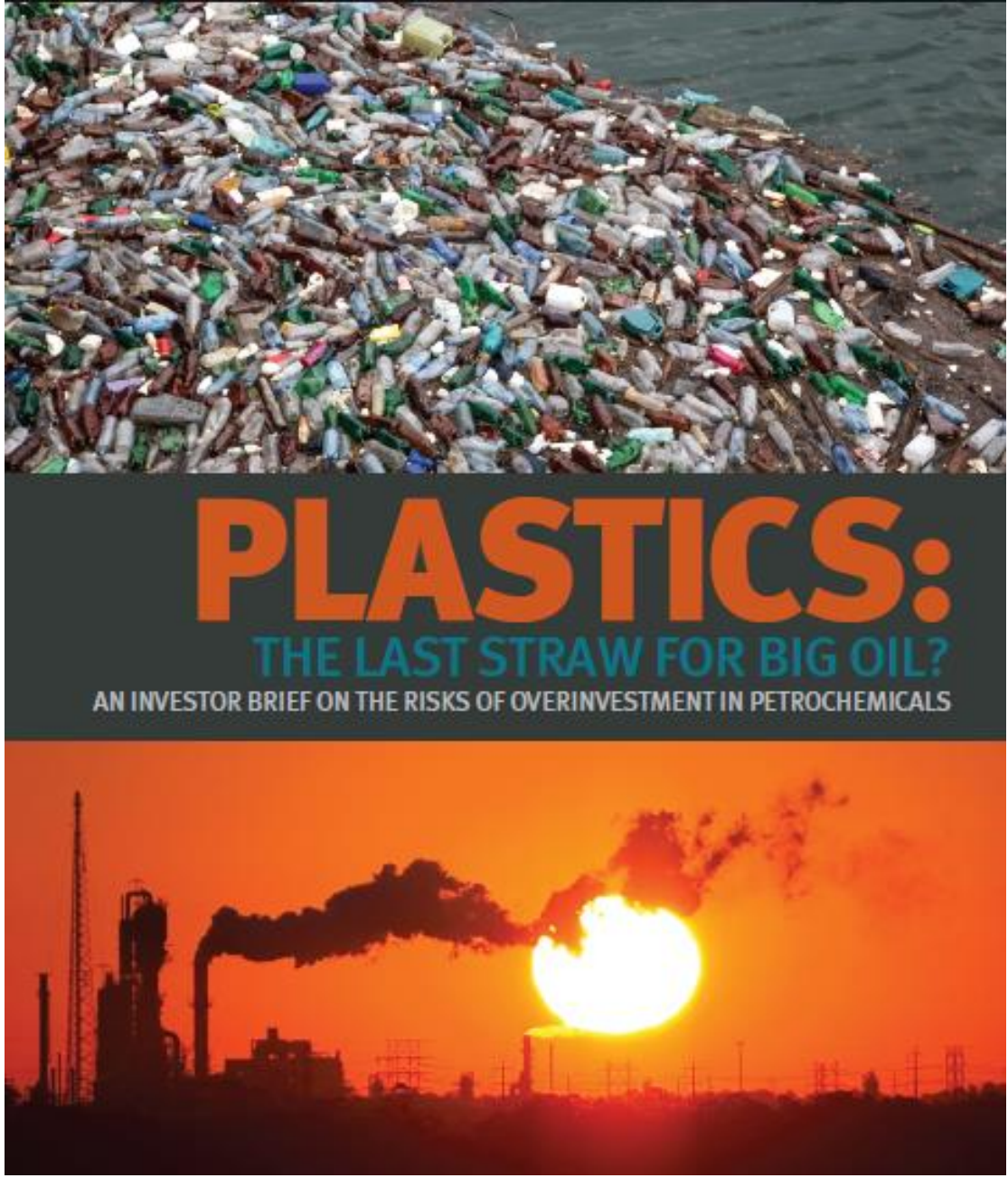

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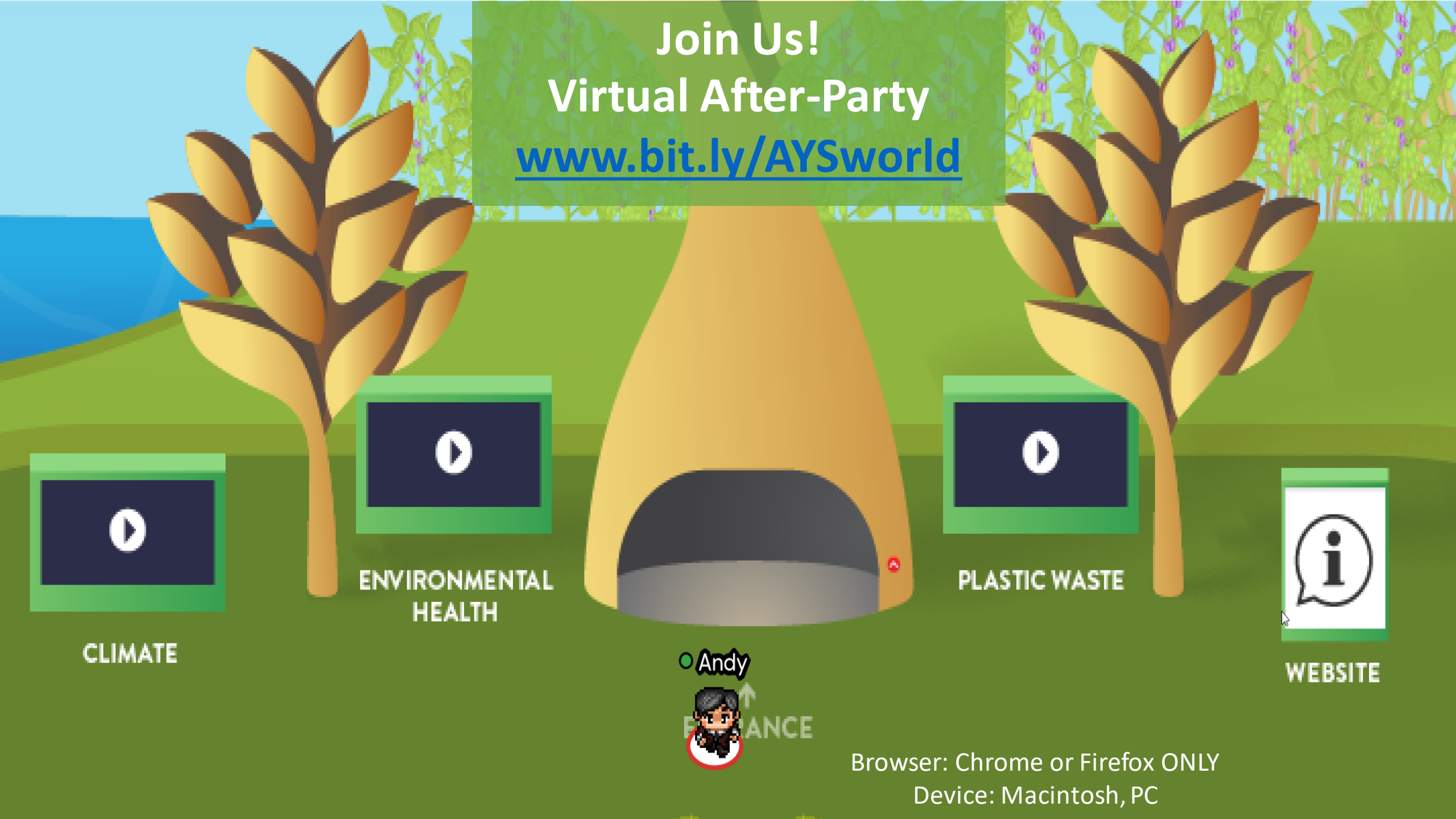
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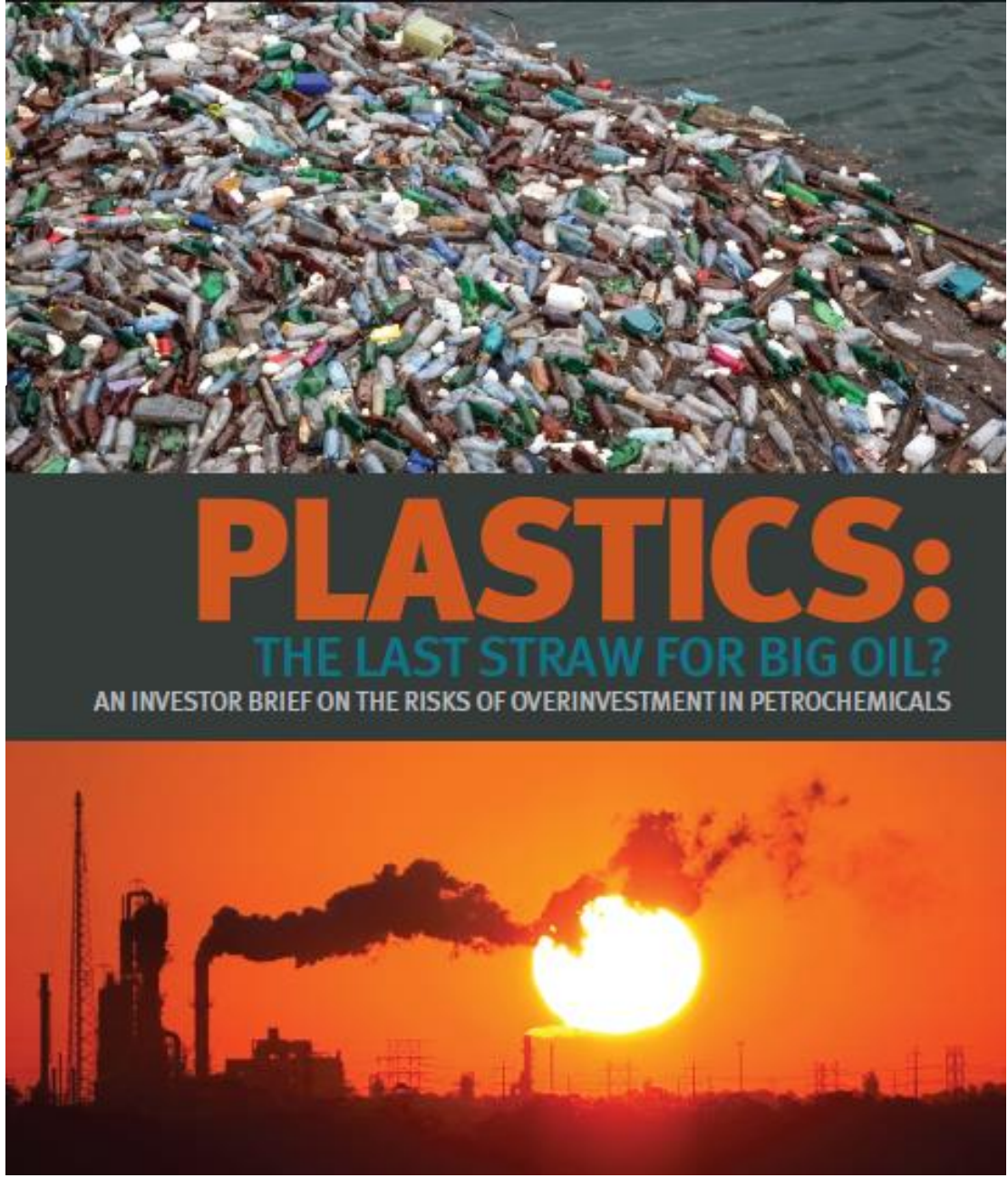

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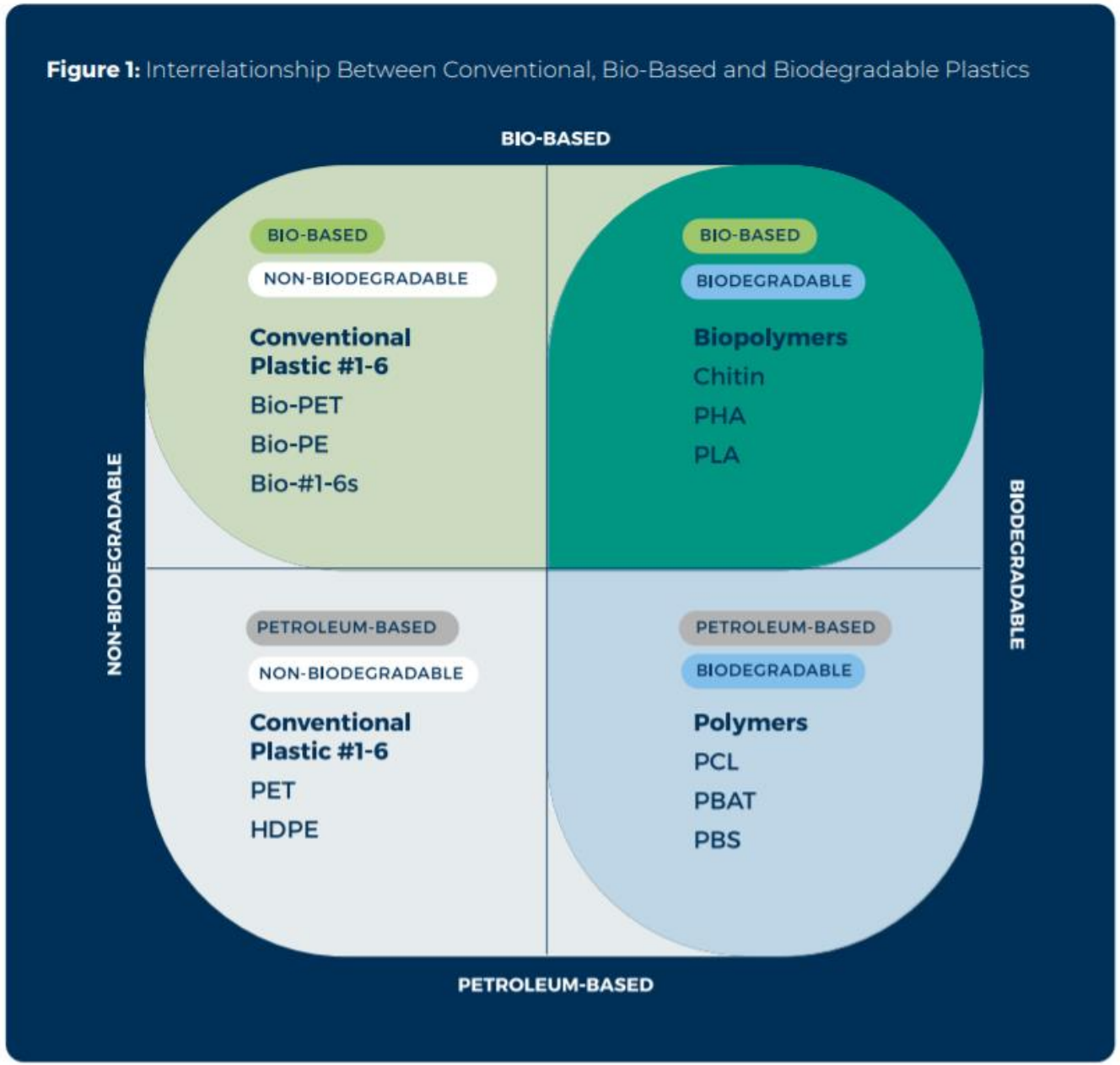
Table 1: "Advanced" Recycling Technologies Comparison

Technology Group	Applicable Commodity Plastics (PE, PP, PET, PS, PVC)*	Main Benefits	Main Concerns
Pyrolysis *Conversion of plastic waste into a desired liquid product ("pyrolysis oil").*	PE PP PS	• Can handle mixed plastic waste and higher levels of contamination than mechanical recycling • Potential for plastic-to-plastic recycling • Flexible technology (many process variables to tune) • Products can be processed in existing refinery equipment	• Plastic-to-fuel more likely • Large feedstock and energy requirement • Cost of collection, sorting, and pre-treatment at scale • Low-quality products • Lack of economic and environmental data at scale
Gasification *Conversion of plastic waste into a desired gas product (usually syngas).*	PE PP PS	• Can handle mixed plastic waste and higher levels of contamination than mechanical recycling • Potential for plastic-to-plastic recycling • Syngas is a valuable product • Products can be processed in existing refinery equipment	• Plastic-to-fuel or plastic-to-fertilizer more likely • Large feedstock and energy requirement • Cost of collection, sorting, and pre-treatment at scale • Large environmental concerns
Purification *Purification of plastic polymers with the use of solvents.*	PET PVC PS PE PP	• Potential for near-virgin recycling of several key polymers and removal of additives • Potential as a waste-sorting technology	• Cost of solvent/anti-solvent (if solvent recovery is low) • Large, single-stream feedstock requirement • Concerns about quality of products
Depolymerization *Chemical degradation of plastic polymers into base monomers with the use of solvents.*	PET	• Potential for "infinite recyclability" into virgin-grade plastic	• Most undeveloped and unproven chemical recycling technology • Cost of solvent (if solvent recovery is low) • Large, single-stream feedstock requirement • Concerns about quality of products

* Analysis of chemical recycling technologies considered only main commodity plastics (resin codes #1-6)



SOURCE: Closed Loop Partners, *Navigating Plastic Alternatives in a Circular Economy: A Closed Loop Partners Report*, 2020, https://www.closedlooppartners.com/wp-content/uploads/2020/12/Navigating-Plastic-Alternatives-In-a-Circular-Economy.pdf.

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