

GREENPEACE

THE CLIMATE EMERGENCY UNPACKED

**HOW CONSUMER GOODS COMPANIES
ARE FUELING BIG OIL'S PLASTIC EXPANSION**

REPORT SUMMARY





- Ⓐ A tar sands 'upgrader' plant.
© Ian Wilms / Greenpeace
- Ⓑ Shopping for single-use water bottles.
© 2017 Tony Thiethoaly/Shutterstock
- Ⓒ Waste incinerator plant with smoking
smokestack. © 2017 Roneyda/
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REPORT SUMMARY

As the climate crisis intensifies, there is growing worldwide acceptance of the need to slash greenhouse gas (GHG) emissions from the burning of fossil fuels. In response to the threat to their future profitability arising from changes in the transportation and energy sectors, fossil fuel majors such as Aramco,¹ Total,² Exxon,³ and Shell⁴ are reportedly making massive investments in petrochemicals and plastics production. But with GHGs emitted at every stage of the plastic life cycle, there is a real danger that the projected petrochemical expansion will contribute to locking the world into a catastrophic high-emissions trajectory, threatening humanity's ability to keep global heating below 1.5 degrees Centigrade (°C).⁵

In this report, we argue that (1) as some of the biggest buyers of single-use plastic packaging - which is the largest end use of virgin plastic globally - giant fast-moving consumer goods companies (FMCGs) including Coca-Cola, Nestlé, and PepsiCo are driving the expansion of plastic production, and (2) this expansion threatens the global climate as well as communities and ecosystems around the world. We expose the business links and joint lobbying efforts between FMCG companies and the oil and gas industry, and call out their lack of transparency around plastic emissions reporting and their failure to significantly reduce the use of single-use plastic packaging. Furthermore, we urge these companies to stop fueling climate change and the plastic pollution crisis by phasing out single-use plastic and shifting toward reuse systems and package-free products.



Captions and credits for this graphic see page 24.

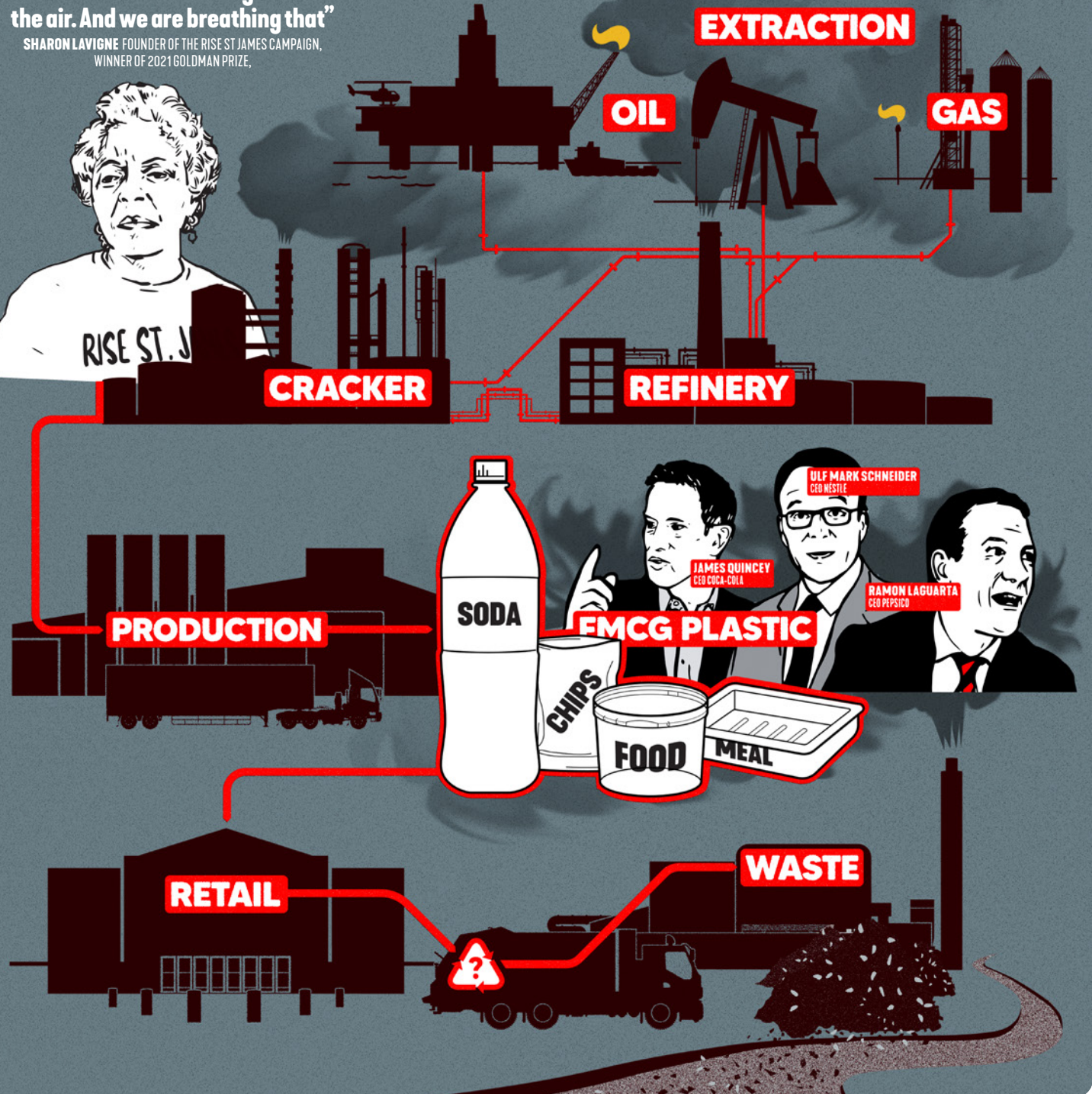
THE EMISSION INTENSIVE PLASTIC PRODUCTION SYSTEM

HOW OIL AND GAS ARE TURNED INTO PLASTIC PACKAGING – AND WHAT BECOMES OF THAT PACKAGING AFTER IT HAS BEEN USED

FROM BREATHE THIS AIR, PEAK PLASTIC FOUNDATION.

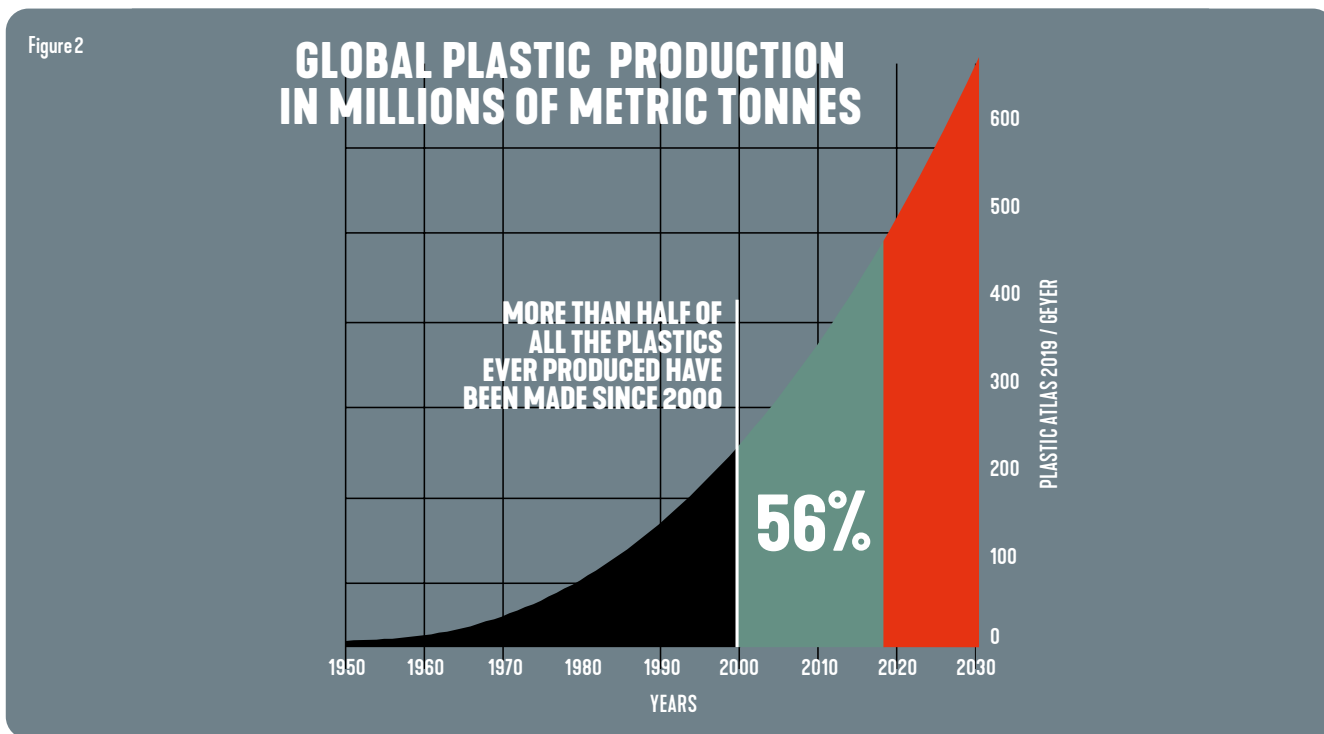
“The plastics we use in our everyday life, the chemicals that are used to make those items are being emitted in the air. And we are breathing that”

SHARON LAVIGNE FOUNDER OF THE RISE ST JAMES CAMPAIGN, WINNER OF 2021 GOLDMAN PRIZE,



KEY FINDINGS

PLASTICS ARE CONTRIBUTING TO CLIMATE CHANGE, YET THE FOSSIL FUEL INDUSTRY IS EXPANDING PRODUCTION



More than 99% of plastic is made from fossil fuels,⁶ and GHGs are emitted at every stage of the plastic life cycle: during gas and oil extraction, refining and production of plastic, incineration and landfilling, and even recycling of plastic.

In the past, many analyses of plastics' climate impact focused only on the emissions from resin production and manufacturing of plastic products. They excluded the large upstream contribution of fossil feedstocks, including large-scale leakage and venting of methane during gas and oil fracking,⁷ as well as the impact of end-of-life disposal.

In 2019, the Center for International Environmental Law (CIEL) issued a landmark report that estimated the global emissions of the *entire* plastic life cycle. It concluded that oil extraction, transportation, and refining for plastic production are responsible for emissions of approximately 108 million metric tons of carbon dioxide equivalent (CO₂e) worldwide, with natural gas extraction and transportation for plastic production in the U.S. alone contributing an additional 9.5 to 10.5 million metric tons a year.⁸ Estimated emissions from other parts of the plastic life cycle are shown in Figure 1.

CIEL also calculated that during 2019 alone, global emissions for the total plastic life cycle, when production and end of life are properly factored in, were equivalent to nearly 200 coal-fired power stations.⁹

Despite these climate impacts, and increasing plastic pollution, global production and consumption of plastic is predicted to continue to increase dramatically, as it

has since the 1950s (Figure 2).¹⁰ According to trade body PlasticsEurope, in 2020 global plastic production reached 367 million metric tons, up from 359 million metric tons in 2018.¹¹ If business as usual continues, industry estimates predict that plastic production could double by 2030-2035 and triple by 2050 in comparison with 2015.¹²

This projected growth in plastic production – if allowed to happen – would mean global emissions from the plastic life cycle would increase by more than 50% over 2019 levels to 1.34 billion metric tons of CO₂e a year by 2030, equivalent to nearly 300 coal-fired power plants, and more than double again by 2050.¹³ The sector's total emissions by 2050 could use between 10% and 13% of the entire 1.5 °C carbon budget, rising to a quarter or more by 2100.¹⁴

Recent analysis by the Minderoo Foundation supported these growth predictions. It found that producers of the five primary single-use plastic polymers plant to increase capacity by 30% – an additional 70 million metric tons – between 2020 and 2025, with Exxon, Shell, Saudi Aramco, Formosa, and Borealis among the top producers adding virgin polymer capacity.¹⁵ The Minderoo report also indicates that Exxon is one of three producers adding the most capacity, and Shell is notably expanding capacity at a growth rate of 145% for the same five-year period. The key areas for this expansion appear to be in India, North America, the Middle East, China, and Southeast Asia (more details follow).

Figure 3

TOP THREE FMCG COMPANIES **TOTAL PLASTIC PACKAGING** USE IN 2019 AND THE CO2 EMISSIONS CAUSED BY THAT

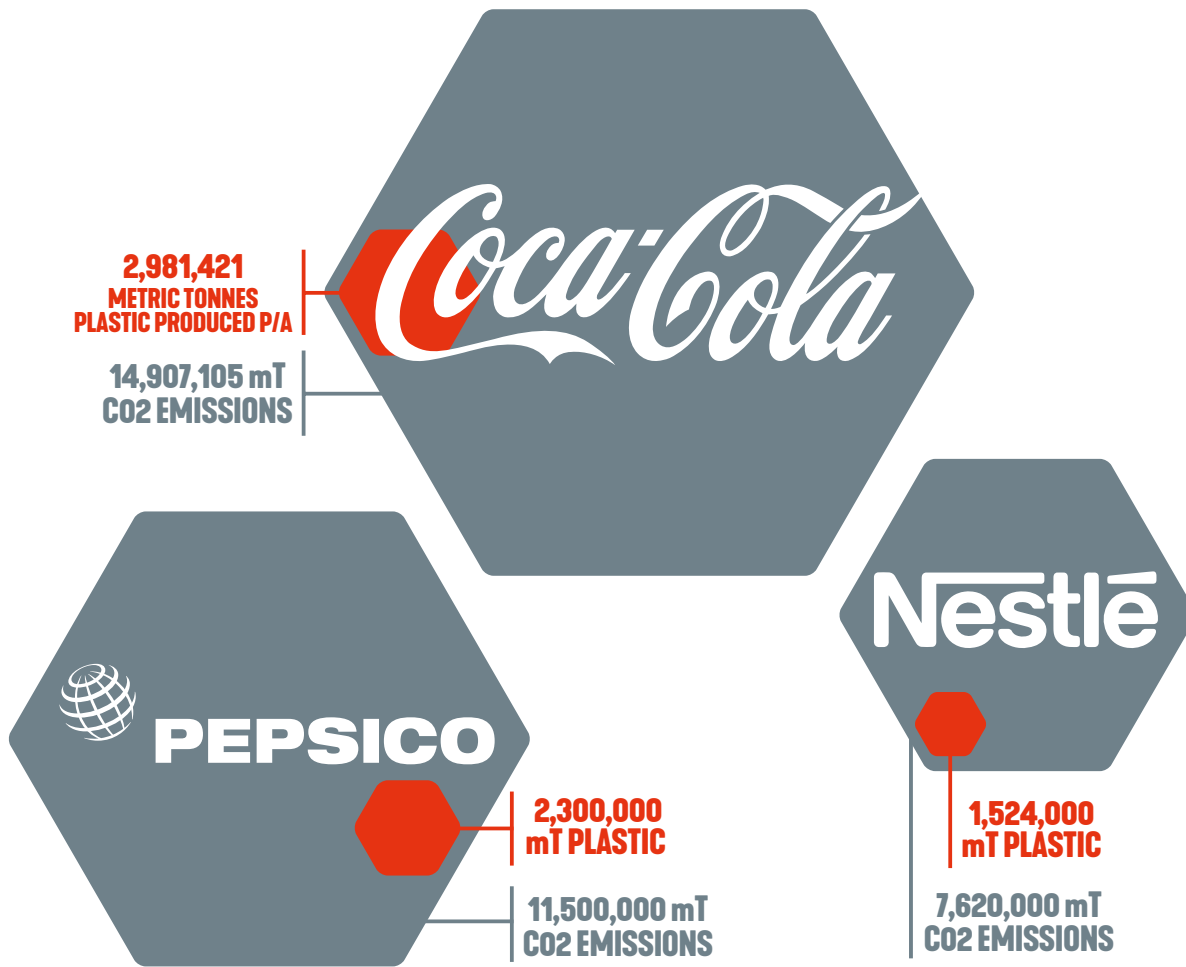
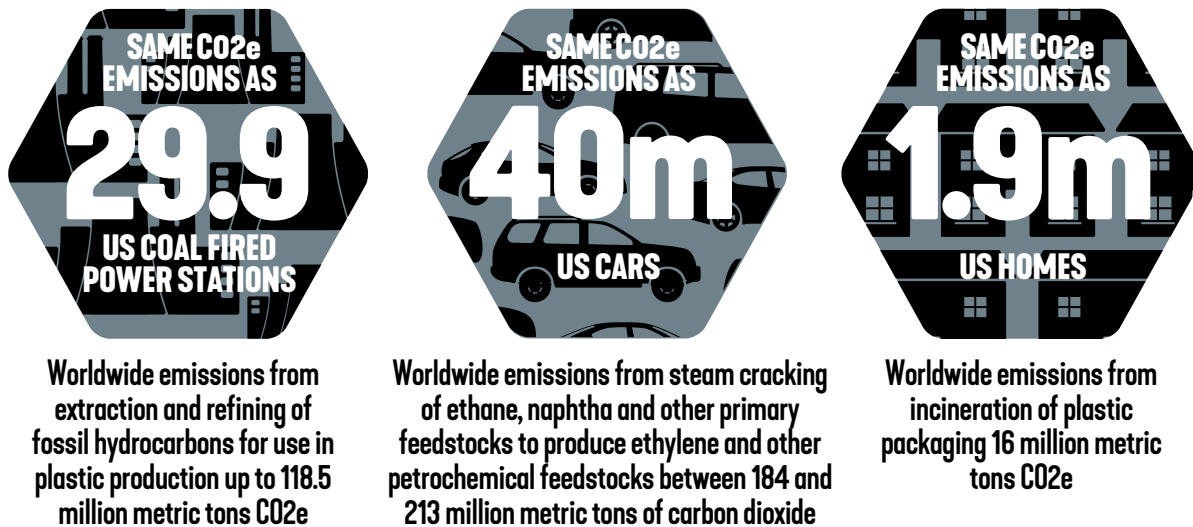


Figure 4

WORLDWIDE PLASTICS INDUSTRY EMISSIONS EQUIVALENCIES



CONSUMER GOODS COMPANIES

LIKE COCA-COLA, NESTLÉ, AND PEPSICO ARE HELPING ENABLE THE FOSSIL FUEL INDUSTRY'S EXPANSION OF PLASTIC PRODUCTION

A. Single-use plastic packaging is a key driver of plastic expansion, and big brands are failing to significantly reduce it. The single largest use of virgin plastic annually is for packaging, which accounts for around 40% of total (nonfiber) plastic demand and accounts for more than half of plastic waste worldwide.¹⁶ Also industry projects growth driven by sharp increases in plastic consumption in developing economies.¹⁷

As some of the world's largest users of single-use plastic packaging, FMCG giants such as Coca-Cola, PepsiCo, Nestlé, Mondelez, Danone, Unilever, Colgate Palmolive, Procter & Gamble, and Mars are playing a key role in driving the demand for plastic. For instance Coca-Cola alone put 112 billion single-use plastic bottles onto the market in 2020.¹⁸

Despite high-level pledges by these brands to tackle plastic pollution in response to growing public and regulatory pressure, in reality these companies and others in the sector have made very little progress on reducing throwaway plastic, or increasing levels of reuse. In fact, a 2020 review of action by companies signed up to the Ellen MacArthur Foundation Global Plastics Commitment, found that plastic packaging use by signatories actually grew by 0.6% in 2019. Furthermore, reusables – repeatedly found to be the real solution to the crisis – accounted for just 1.9% of their packaging, up just 0.1% from the previous year (Figure 3).¹⁹

B. FMCG companies are linked to fossil fuel companies throughout the plastics supply chain. The plastic supply chain is largely opaque, making it difficult to trace an individual single-use plastic package sold by an FMCG company back through the processes of packaging manufacturing, plastic resin production, petrochemical production, refining and processing, and oil and gas extraction. But almost every type of plastic packaging is the end product of its own multi-stage production process that begins with a fossil fuel – oil, gas or coal. And while these processes differ in their details, the general business relationships are similar.

The world's largest plastic resin producers, such as ExxonMobil, Shell, and ChevronPhillips, are vertically integrated fossil fuel/petrochemical companies that make their own petrochemicals from their oil and gas operations – sometimes purchasing additional key inputs from

other companies – and then produce and market plastic resin. Some of these companies, including ExxonMobil, produce and market resins specifically designed for particular packaging applications, such as films, wraps, and pouches.²⁰ These resins are purchased by packaging manufacturers such as Amcor and Berry Global; such companies are known as “converters,” as they convert the resin into products.

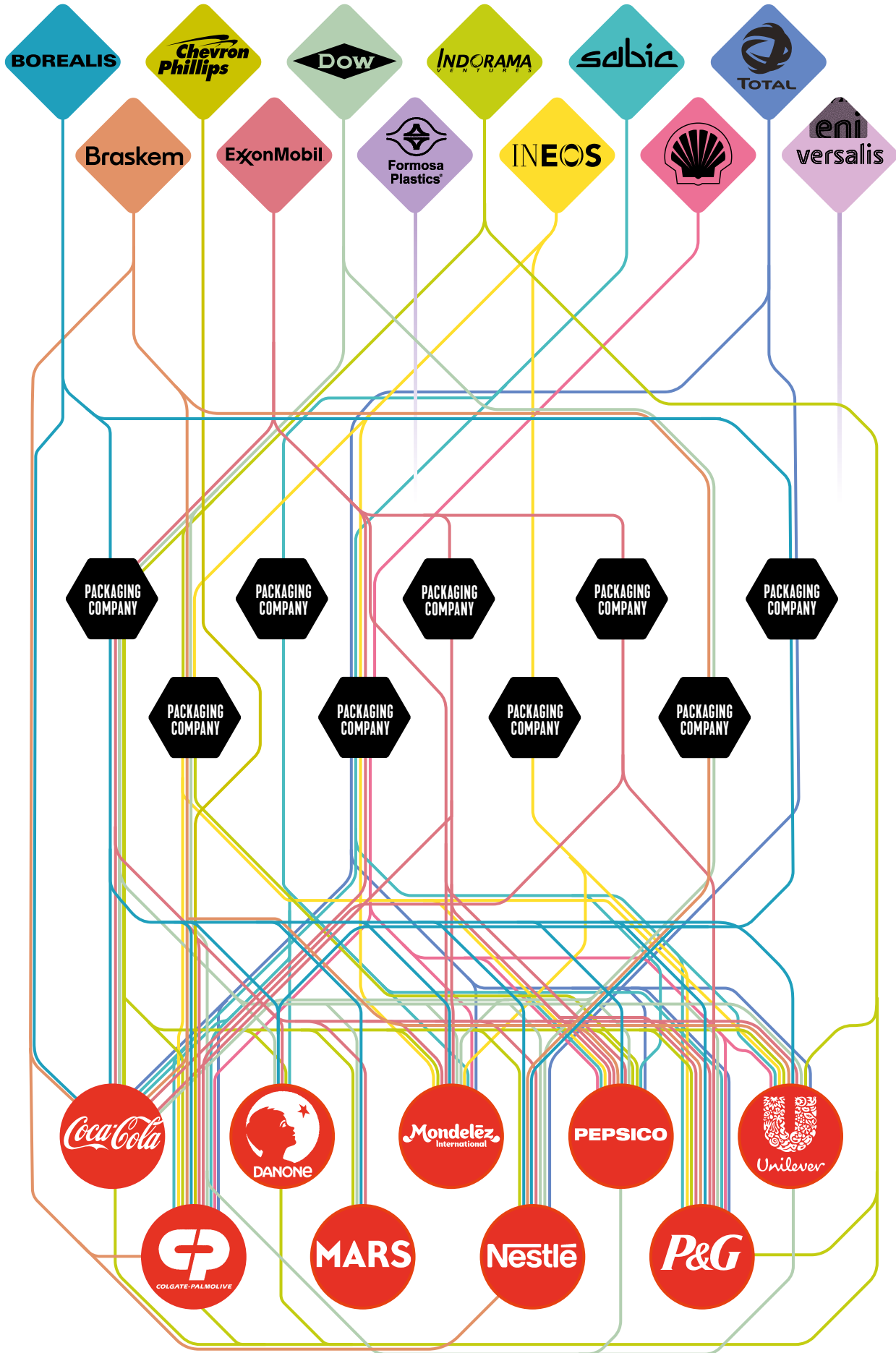
This report looks at the supply chain relationships between nine major FMCG companies and 12 key resin producers providing the world with plastic resin and packaging. Ten of the resin producers are large fossil fuel companies, and only two exclusively make plastic and plastic packaging. At least one analysis suggests that nearly all of the resin producers profiled here have at least half of their capacity tied directly to plastic packaging.²¹

To determine which of the top 25 plastic resin producers to focus on we reviewed worldwide 2019 plastic resin production capacity, prioritizing polyethylene and polypropylene for their relevance to the plastic packaging market. This led us to select ExxonMobil (#1 in worldwide capacity²²), Dow (#2), Sabic, a subsidiary of Saudi Aramco (#3), Ineos (#5), Braskem (#6), Formosa (#8), Total (#12), Indorama (#13), ChevronPhillips Chemical (#15), and Borealis, a subsidiary of OMV (#22), as well as Shell Chemical, and Versalis, a subsidiary of Eni.

Our investigation revealed plastic supply chain connections between every single FMCG company we researched and at least one major fossil fuel and/or petrochemical company. Coca-Cola, PepsiCo, Nestlé, Mondelez, Danone, Unilever, Colgate Palmolive, Procter & Gamble, and Mars all buy packaging from manufacturers supplied with plastic resin or petrochemicals by well-known companies like ExxonMobil, Shell, Chevron Phillips, Ineos, and Dow.

Unsurprisingly, FMCG companies tend not to advertise their reliance on the industry that poses the number one threat to the global climate. This lack of transparency allows FMCG companies to evade accountability for any environmental and human rights violations committed by the companies that supply the plastic or fossil feedstocks for their plastic packaging, and to trumpet climate commitments that ignore their role in enabling the fossil fuel industry's pivot to expand petrochemical production to make plastic (Figure 4).

Figure 5



Known and suspected supply chain connections between fossil fuel companies and consumer brands shown here.

BIG BRANDS ARE FAILING ON TRANSPARENCY

AND WORKING WITH THE FOSSIL FUEL INDUSTRY TO USE RECYCLING AS A SMOKESCREEN

A. Emissions from plastic packaging could be much higher than FMCGs are reporting. While many FMCG companies disclose the GHG emissions attributed to their overall supply chain, and in some cases the total emissions that they attribute to plastic packaging, none of the nine major companies we surveyed for this report (Coca-Cola, PepsiCo, Nestlé, Mondelēz, Danone, Unilever, Colgate Palmolive, Procter & Gamble, and Mars) publicly discloses how it calculates the emissions produced by each metric ton of plastic that it uses - making independent verification of their claims impossible. Given that some life-cycle analyses of plastic performed or relied on by FMCG companies likely do not fully include the impacts attributable to upstream oil and gas exploration and extraction, the GHG emissions of these companies' plastic packaging could be much higher than they realize or are willing to disclose. This could also be the case if the companies are failing to take proper account of the risk of their packaging being incinerated, for example by mapping their local sales data onto publicly available information about municipal waste disposal methods.

Analyses that include both embedded upstream emissions as well end-of-life emissions (associated with landfill, incineration, or recycling) have estimated the average emissions of plastic production at around 5 metric tons of CO₂e per metric ton of plastic.

B. FMCG companies have partnered with the fossil fuel industry for decades to promote plastic recycling despite its failures. Globally, as of 2015, only 9% of all plastic waste ever created had been recycled.²³ One study estimated that less than 1% of plastic has been recycled more than once.²⁴ As a result, most plastic packaging ends up either "downcycled" into lower-grade products or in a landfill, in the environment, or incinerated.²⁵ One analysis reported the 2018 U.S. domestic recycling rate at just 2.2%,²⁶ and similarly abysmal rates can be found around the world. Recent Greenpeace USA research shows that much of the plastic packaging used by food and beverage companies in the U.S. has so little chance of being recycled by municipal systems that the "recyclable" labels on the products in question appear not to meet the legal requirements for such claims, putting the companies at risk of legal challenge for deceptive marketing.²⁷

Furthermore, plastic recycling and technologies like pyrolysis, or so-called "chemical recycling," cannot resolve the plastic pollution problem and are being used as a smokescreen by industry to divert attention from the systemic changes that are needed. "Chemical recycling" is an intentionally vague term used by the chemical and plastic industries to refer to myriad technologies (many of which remain in the lab or pilot phases), all promising to convert plastic waste into its basic chemical building blocks and generate "like new" plastic. Without a widely accepted technical definition, the industry has often attempted to conflate waste-to-fuel/plastic-to-fuel and plastic-to-plastic under the respective umbrellas of "chemical recycling" and "advanced recycling." Waste-to-fuel/ plastic-to-fuel conversion comprises existing technologies like pyrolysis and gasification, as well as still-theoretical methods. Since these processes produce fossil fuels, energy, or petrochemicals, they should not be considered recycling. Plastic-to-plastic methods would theoretically turn plastic waste directly into its chemical precursors, but these promises may never actually deliver, and even if they did, would only address a very marginal portion of the problem.

The fact that the American Chemistry Council (ACC), in arguing for light-touch regulation of chemical recycling, states that "Advanced recycling facilities ... receive plastic feedstock that is converted to valuable fuels and petroleum products" and that "regulations should identify companies that manufacture fuels and petroleum products from post-use plastics feedstock as producers of alternative energy,"²⁸ shows clearly where the industry's priorities lie. One major pyrolysis proponent, Dow Chemical, has even admitted to the National Recycling Coalition that its program "is not recycling."²⁹

Despite the failures of plastic recycling, FMCG companies have been working in partnership with the fossil fuel, petrochemical, and packaging sectors to promote it, oppose legislation that would restrict single-use packaging, and/or adopt so-called "chemical recycling" as part of their "circular economy" commitments.

Such alliances can trace their inspiration back to Keep America Beautiful, an organization set up in the 1950s to promote the idea that litter was consumers', not companies', responsibility - and still going strong today with board membership including BlueTriton Brands (formerly



ALLIANCE TO END PLASTIC WASTE



The Alliance to end Plastic Waste's apparent enthusiasm for recycling is matched only by their member's commitment to fossil fuel extraction and single use plastic production.

The Alliance sponsors projects aiming to improve recycling infrastructure and develop technologies, but has yet to announce any significant achievements. Instead, its highly publicised project with Renew Oceans to recycle plastic waste from India's River Ganges recently closed after allegedly collecting just one tonne of waste

Industry-Led Program to Solve Plastic Waste Problem Falls by Wayside



Funded by some of the world's biggest oil and chemicals companies, Renew Oceans has failed to meet its goal of keeping plastic waste in the Ganges River from entering the ocean surrounding India.

Clare Goldsberry | Jan 19, 2021

The plastics industry has devoted tremendous resources to trying to solve the plastic waste challenge, even if anti-plastic activists are loath to recognize the efforts. Sometimes, though, the industry gives *itself* a black eye, as is seemingly the case with Renew Oceans. Funded by some of the world's biggest oil and chemicals companies, Renew Oceans has failed to meet its intended goal of keeping plastic waste in the Ganges River from entering the ocean surrounding India.

According to a Reuters report, the "closure of Renew Oceans... is a sign that an industry whose



Nestlé Waters North America³⁰), Mars, PepsiCo, and Dow Chemical.³¹ In the late 1980s, faced with the threat of anti-plastic legislation at the state and even federal levels, the U.S. plastic industry reportedly embarked on a multimillion-dollar PR campaign.³² The industry front group Society of the Plastics Industry (later to become the Plastics Industry Association, or PLASTICS³³) set up the Council for Solid Waste Solutions,³⁴ which reportedly involved fossil fuel and plastic companies, including Amoco, Chevron, Dow, DuPont, Exxon, and Mobil, as well as FMCG major Procter & Gamble.³⁵ By this means, industry largely succeeded in convincing the public that all plastic is recyclable and thus environmentally acceptable, protecting its highly profitable core business of selling virgin, non-recycled plastic.

In a 2020 investigative report by National Public Radio, Larry Thomas, former president of PLASTICS, underscored the intent behind the industry's recycling playbook, saying "If the public thinks that recycling is working, then they are not going to be as concerned about the environment." Thomas continued, "You know, they were not interested in putting any real money or effort into recycling because they wanted to sell virgin material. Nobody that is producing a virgin product wants something to come along that is going to replace it. Produce more virgin material - that's their business."³⁶

A recent example is the U.S. petrochemical sector's front organization, the ACC, lobbying the U.S. government to oppose anti-plastic legislation in Kenya in order to expand U.S. export markets.³⁷ The ACC was an early opponent of domestic plastic bag laws (through its front organization the Progressive Bag Alliance)³⁸ and has promoted "advanced recycling."³⁹ At the same time it has pledged to ensure that all plastic packaging is "re-used, recycled or recovered" - but not until 2040,⁴⁰ a date hardly consistent with the 45% global emissions cut needed by 2030 to keep within the 1.5 °C limit.⁴¹

Another is the Recycling Partnership, with members including PepsiCo, Colgate-Palmolive, Nestlé, and Procter & Gamble, as well as the ACC,⁴² which is reportedly calling for investment in recycling while failing to support the introduction of state-level legislation requiring refundable deposits on plastic bottles (even though such legislation and the resultant collection infrastructure have been shown to increase collection rates massively).⁴³

A newer front group pushing a similarly disingenuous message is the Alliance to End Plastic Waste, formed in 2019 - this time with the involvement of two FMCG majors, PepsiCo and Procter & Gamble, alongside dozens of fossil fuel and plastic companies.⁴⁴ The Alliance sponsors projects aiming to improve recycling infrastructure and develop "chemical recycling" technologies,⁴⁵ but has yet to announce any significant achievements.

FMCG companies have also partnered with fossil fuel and technology companies to develop pyrolysis ("plastic-to-fuel") plants - for example Mars and Nestlé with Total and Recycling Technologies.⁴⁶ One FMCG major, Procter & Gamble, has even developed its own process to purify and recycle contaminated polypropylene using a gas solvent.⁴⁷ It has licensed this process to a company called PureCycle,⁴⁸ which has in turn partnered with Nestlé to develop new packaging⁴⁹ and signed a supply agreement with L'Oréal.⁵⁰ Procter & Gamble has also partnered with two FMCG packaging suppliers: petrochemical giant Total, with which it has a strategic partnership encompassing a U.S. supply agreement and a commitment to explore the feasibility of a plant in Europe,⁵¹ and packaging company Aptar, with which it has formed a product development partnership.⁵² In May 2021, a class action lawsuit was filed alleging PureCycle executives made false and misleading statements, including overstating the effectiveness of the company's technology.⁵³



- A** 2 June 2018. Youngsville, Louisiana, USA. Melinda Tillies watching the installation of the Bayou Bridge Gas Pipeline next to her home. © Julie Dermansky / Greenpeace
- B** 19 March 2015. Karnes County, Texas, USA. Lynn Buehring lives near three different hydrofracking wells, flaring since 2011. She suffers from severe reactions to the chemicals and hydrogen sulfide (H₂S) gas released from the wells. © Les Stone / Greenpeace
- C** 15 January 2001 Cemetery next to the Taft Carbide Plant in Louisiana. © Les Stone / Greenpeace
- D** 10 July 2021 @ Thailand. Explosion at expanded polystyrene (EPS) factory Ming Dih Chemical on 5 July affecting residents in Samut Prakan area. The Factory has since been told by the Thai Industry Ministry to relocate to a less populated location
- E** 10 July 2021. Thailand. Explosion at expanded polystyrene factory Ming Dih Chemical on 5 July severely damaged the facility.
- D** and **E** © Greenpeace / Chanklang Kanthong



THE EXPANSION OF PLASTIC PRODUCTION THREATENS COMMUNITIES AROUND THE WORLD

A. There are human health impacts and environmental justice concerns for communities near plastic production sites. Fossil fuel extraction sites, refineries, and petrochemical plants all emit a range of toxic and carcinogenic chemicals into the air, putting nearby communities as well as local ecosystems at risk. In the case of fracking, surface and groundwater pollution can also be significant. A recent compendium of scientific studies concluded that its examination “uncovered no evidence that fracking can be practiced in a manner that does not threaten human health.”⁵⁴

The health and environmental impacts of plastic production disproportionately affect low-income and marginalized communities around the world and are linked to health issues such as cancer and asthma, yet big brands are ignoring these impacts and avoiding their responsibility for them.

As of 2010 in the U.S., 17.6 million people (6% of the population) lived within a mile of an active oil or gas extraction site. According to the recent report *Fossil Fuel Racism* by Greenpeace USA, the Gulf Coast Center for Law & Policy, and the Movement for Black Lives,⁵⁵ 56% of the “toxic burden” of U.S. refineries is borne by people of color (who make up 39% of the country’s population) and 19% by low-income people (who make up 14% of the population). The petrochemical sector’s impact on people of color is even worse: they bear 66% of the toxic burden, while 18% falls on low-income people. For both refineries and petrochemical facilities, a majority of toxic burden falls in areas that have both above-average populations of color and below-average income.⁵⁶

Louisiana’s “Cancer Alley” is a region along the lower Mississippi River that acquired its nickname in the 1980s as a result of suspected cancer clusters that locals believed stemmed from toxic pollution from nearby chemical plants⁵⁷ – the region currently has nearly 150 oil refineries and plastic and chemicals facilities.⁵⁸ It is also home to an above-average African American population⁵⁹ whose human rights are severely threatened

by the concentration of polluting industries, according to the UN.⁶⁰





One study found that census tracts with the highest risk of toxic air pollution exposure were predominantly located in two parishes, East Baton Rouge Parish and Orleans Parish, which had Black populations of 84% and 60% respectively.⁶¹ According to the EPA’s 2015 National Air Toxics Assessment map, seven out of the 10 census tracts with the highest levels of air pollution-related cancer risk in the U.S. are located in St. John the Baptist Parish,⁶² another of the 11 parishes that make up Cancer Alley.⁶³ As the founder of environmental justice group RISE St. James puts it, polluting industries “come to Black communities because they think no one’s going to say anything.”⁶⁴

Turning to end-of-life impacts, toxic emissions from incineration (including so-called “waste-to-energy”) also threaten the health of nearby residents.⁶⁵ In the U.S., approximately 80% of waste incinerators are located in low-income communities, communities of color, or both.⁶⁶ Incinerators being built in the UK are following the same pattern; they are three times more likely to be built in low-income communities with high populations of people of color.⁶⁷ Landfills often present similar environmental injustices.⁶⁸

The plastic waste trade also particularly impacts communities in the Global South – where historically much of Europe’s and North America’s plastic waste has been exported, supposedly for recycling. China used to take the bulk of this waste, but since it banned plastic imports in 2018, plastic waste streams have been redirected, first toward Southeast Asian and African countries⁶⁹ and more recently to Turkey as well.⁷⁰ A series of investigations revealed that some of this exported waste is being illegally dumped and polluting local environments. For instance, Greenpeace investigators from Italy, UK, and Malaysia found household plastic from countries including the UK,⁷¹ Italy,⁷² and Germany⁷³ at multiple illegal dump sites in Malaysia, while a BBC investigation found British plastic waste being burned near communities in Turkey.⁷⁴

THE FOSSIL FUEL INDUSTRY IS EXPANDING PLASTIC PRODUCTION GLOBALLY

WITH KEY AREAS IN INDIA, NORTH AMERICA, THE MIDDLE EAST, CHINA, AND SOUTHEAST ASIA

-  New Ethylene Cracker
-  Oil pipeline
-  Gas pipeline
-  Oil/Gas Field

Plastic production is unevenly distributed globally. Currently Asia, North America, and Europe are the biggest producers; within Asia, China is the major player, producing an estimated 31% of the world's plastic, according to PlasticsEurope.⁷⁵

Publicly available data are limited regarding where plastic production is set to increase. However projected ethylene production offers a reasonable proxy for future plastic expansion, and here data are available. Industry analysts identify India,⁷⁶ North America, the Middle East, China, and Southeast Asia⁷⁷ as key regions looking to expand ethylene production capacity.

Factors expected to drive expansion in these regions include cheap ethane (North America⁷⁸ and the Middle East), low capital costs (China), and unmet demand for ethylene derivatives along with the desire to balance trade and generate employment (China, India, Southeast Asia). However, China and North America are expected to continue to be the largest drivers of global ethylene demand growth as they add production capacity for ethylene and derivatives.⁷⁹

The map following provides a snapshot of where the expansion is happening and examples of notable projects.

BOREALIS + **TOTAL**
Keep Discovering

BAYPORT POLYMERS (BAYSTAR), PORT ARTHUR, TEXAS. Capacity - 1.0 total, Downstream 0.625 PE.

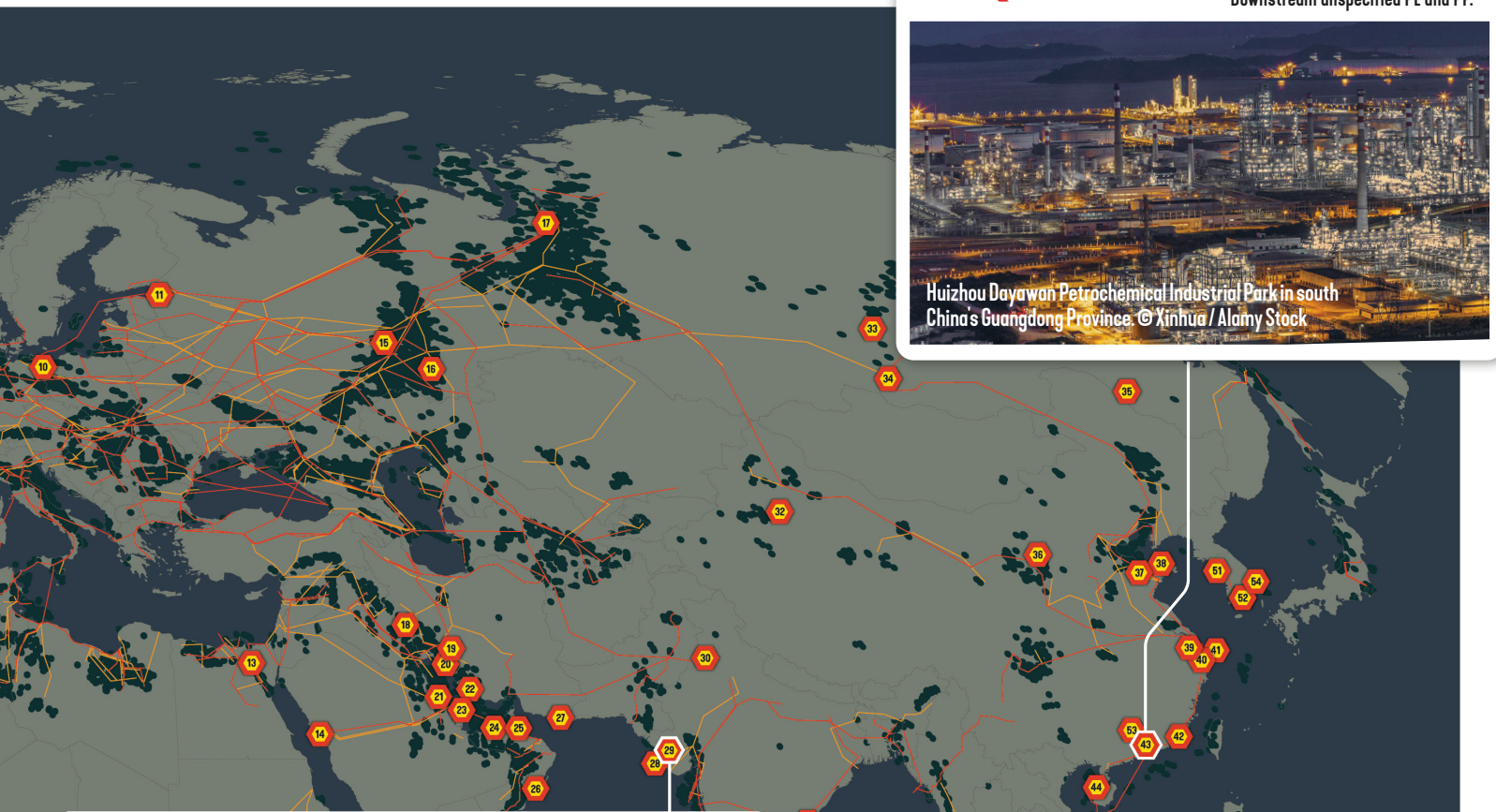


9 December 2019

1	OWNER: West Coast Olefins FACILITY: Prince George, BC, Canada CRACKER: 1.0 ethylene DOWNSTREAM: Unspecified capacity PE. DATES: Start-up due 2024	1	OWNER: Ineos FACILITY: Antwerp, Belgium CRACKER: 0.725 propylene DOWNSTREAM: Cracker start-up due 2026. POH unit start-up originally due 2023, but postponed in Jan 2021	11	OWNER: Saudi Aramco / Sabic FACILITY: Yanbu, Al Madinah Province, Saudi Arabia CRACKER: 1.25 ethylene DOWNSTREAM: unconfirmed - world-scale unconfirmed tbc	17	OWNER: Saudi Aramco / Total FACILITY: Jubail, Eastern Province, Saudi Arabia CRACKER: 1.0 ethylene DOWNSTREAM: Completion due 2024
2	OWNER: ExxonMobil / SABIC - Gulf Coast Growth Ventures FACILITY: San Patricio County, Corpus Christi, Texas, USA CRACKER: 1.8 total DOWNSTREAM: 1.3 PE, 1.1 monoethylene glycol (MEG). DATES: Due to open in Q4 2021	2	OWNER: Borealis FACILITY: Kello, near Antwerp, Belgium CRACKER: 0.74 propylene DOWNSTREAM: Start-up end 2022, but likely to slip due to Covid	12	OWNER: Nizhnekamskneftekhim (NKNK) FACILITY: Ethylene-810, Nizhnekamsk, Tatarstan, Russia CRACKER: 0.9 ethylene, 0.27 propylene. DOWNSTREAM: Start-up due second half of 2023	18	OWNER: Bushehr PC FACILITY: Asaluyeh Ethylene Plant, Asaluyeh (aka Asaluyeh/Asaluyeh), Bushehr Province, Iran CRACKER: 1.0 ethylene DOWNSTREAM: Completion due by 2022
3	OWNER: Total / Borealis FACILITY: Bayport Polymers (Baystar) and Port Arthur, Texas CRACKER: 1.0 total DOWNSTREAM: 0.625 PE. DATES: Cracker due to open 2021, downstream 2022	3	OWNER: Grupa Azoty Polyoletfin FACILITY: Palice, West Pomerania Province, Poland CRACKER: 0.428 propylene DOWNSTREAM: 0.437 PP. DATES: Start-up originally scheduled for Q4 2022 but postponed until Q1 2023 due to Covid	13	OWNER: Gazprom FACILITY: Gazprom Neftekhim Salavat, Salavat, Republic of Bashkortostan, Russia CRACKER: 1.0 ethylene DOWNSTREAM: 0.418 PE, 0.617 PP. DATES: Completion due between 2023 and 2025.	19	OWNER: Qatar Petroleum / Chevron Phillips Chemical FACILITY: Ras Laffan, Qatar CRACKER: 1.9 ethylene DOWNSTREAM: 1.68 PE. DATES: Start-up due late 2025
4	OWNER: Chevron Phillips Chemical / Qatar Petroleum FACILITY: Gulf Coast / Orange, Texas CRACKER: 2.0 total DOWNSTREAM: 2.0 PE. DATES: Start-up projected for 2024, on hold - COVID	4	OWNER: RusBazobycha FACILITY: Baifco Chemical Complex, Ust-Luga, Leningrad Oblast, Russia CRACKER: 2.8 ethylene DOWNSTREAM: 2.80 PE. DATES: Start-up due 2023 and 2024	14	OWNER: PJSC Sibur / Gazprom FACILITY: Novy Urengoy Gas Chemical Complex, Tura, Yamalo-Nenets Autonomous Area, Siberia, Russia CRACKER: 0.42 ethylene DOWNSTREAM: 0.4 PE. DATES: Start-up due mid-2020s	20	OWNER: Abu Dhabi National Oil Co / Borealis FACILITY: Borouge, Ruwais, Abu Dhabi, United Arab Emirates CRACKER: 1.8 ethylene, unspecified propylene DOWNSTREAM: unspecified PE and PP. DATES: Start-up due 2025
5	OWNER: Formosa Plastics FACILITY: Sunshine Project, St James' Parish, Louisiana CRACKER: Phase 1, 1.2 total, Phase 2, 1.2 total DOWNSTREAM: Phase 1, 0.8 PE, 0.6 PP, Phase 2, 0.8 PE. DATES: Phase 1, 2025 and Phase 2, 2028, on hold - COVID	5	OWNER: BUA Group FACILITY: Akwa Ibom State, Nigeria CRACKER: unspecified propylene DOWNSTREAM: 0.285 PP. DATES: Completion due 2024	15	OWNER: PJSC Sibur / Gazprom FACILITY: Novy Urengoy Gas Chemical Complex, Tura, Yamalo-Nenets Autonomous Area, Siberia, Russia CRACKER: 0.42 ethylene DOWNSTREAM: 0.4 PE. DATES: Start-up due mid-2020s	21	OWNER: BQ FACILITY: Liven Plastics Industries Complex, Sohar, Oman CRACKER: 0.88 total or more DOWNSTREAM: 0.8 PE, 0.215 PP. DATES: Cracker start-up due by 2026; downstream units possibly already operational
6	OWNER: Nova Chemicals FACILITY: Sarnia, Ontario, Canada CRACKER: Existing cracker capacity to increase by over 0.4 ethylene, plus new 0.45 PE unit. DOWNSTREAM: Start-up due late 2022	6	OWNER: Carbon Holdings FACILITY: Bahir Petrochemical Complex, Ain Sokhna, Suez Governorate, Egypt CRACKER: 1.35 ethylene, 1.0 propylene DOWNSTREAM: 1.35 PE, 0.7 PP, etc. DATES: Start-up projected for 2023, may have slipped.	16	OWNER: Dehghan Sepah PC FACILITY: Dehghan, Ilam Province, Iran CRACKER: 0.5 ethylene DOWNSTREAM: Completion due 2024	22	OWNER: QO / Kuwait Petroleum International FACILITY: Duqm Refinery and Petrochemicals Company, Duqm, Oman CRACKER: 1.8 ethylene DOWNSTREAM: unspecified PE and PP. DATES: Not yet announced
7	OWNER: Shell FACILITY: Monaca, Pennsylvania CRACKER: 1.5 total DOWNSTREAM: 1.6 PE. DATES: Due for completion early 2025	7	OWNER: Carbon Holdings FACILITY: Bahir Petrochemical Complex, Ain Sokhna, Suez Governorate, Egypt CRACKER: 1.35 ethylene, 1.0 propylene DOWNSTREAM: 1.35 PE, 0.7 PP, etc. DATES: Start-up projected for 2023, may have slipped.	17	OWNER: Gachsaran Petrochemical Company (PC) FACILITY: Gachsaran Ethylene Plant, Kohgiluyeh and Boyer-Ahmad Province, Iran CRACKER: 1.0 ethylene DOWNSTREAM: Completion due by 2022 or 2023	23	OWNER: Sepah Mubaraq FACILITY: Sepah Mubaraq Ethylene Plant, Chabahar, Sistan and Baluchistan Province, Iran CRACKER: 1.35 ethylene DOWNSTREAM: 1.2 PE, unspecified PP. DATES: Completion due by 2030



Huizhou Dayawan Petrochemical Industrial Park in south China's Guangdong Province. © Xinhua / Alamy Stock



JAMNAGAR REFINERY, GUJARAT, INDIA. CAPACITY - New steam cracker: 4.1 ethylene and propylene combined. New multi-zone catalytic cracker and converted fluid catalytic cracker: 8.5 ethylene and propylene combined. Downstream: 3.0 PE, 5.2 PP



The world's largest oil refinery as of 2013 Jamnagar's owner Reliance Industries Ltd plans to convert it from fuel production to petrochemicals and jet fuel.

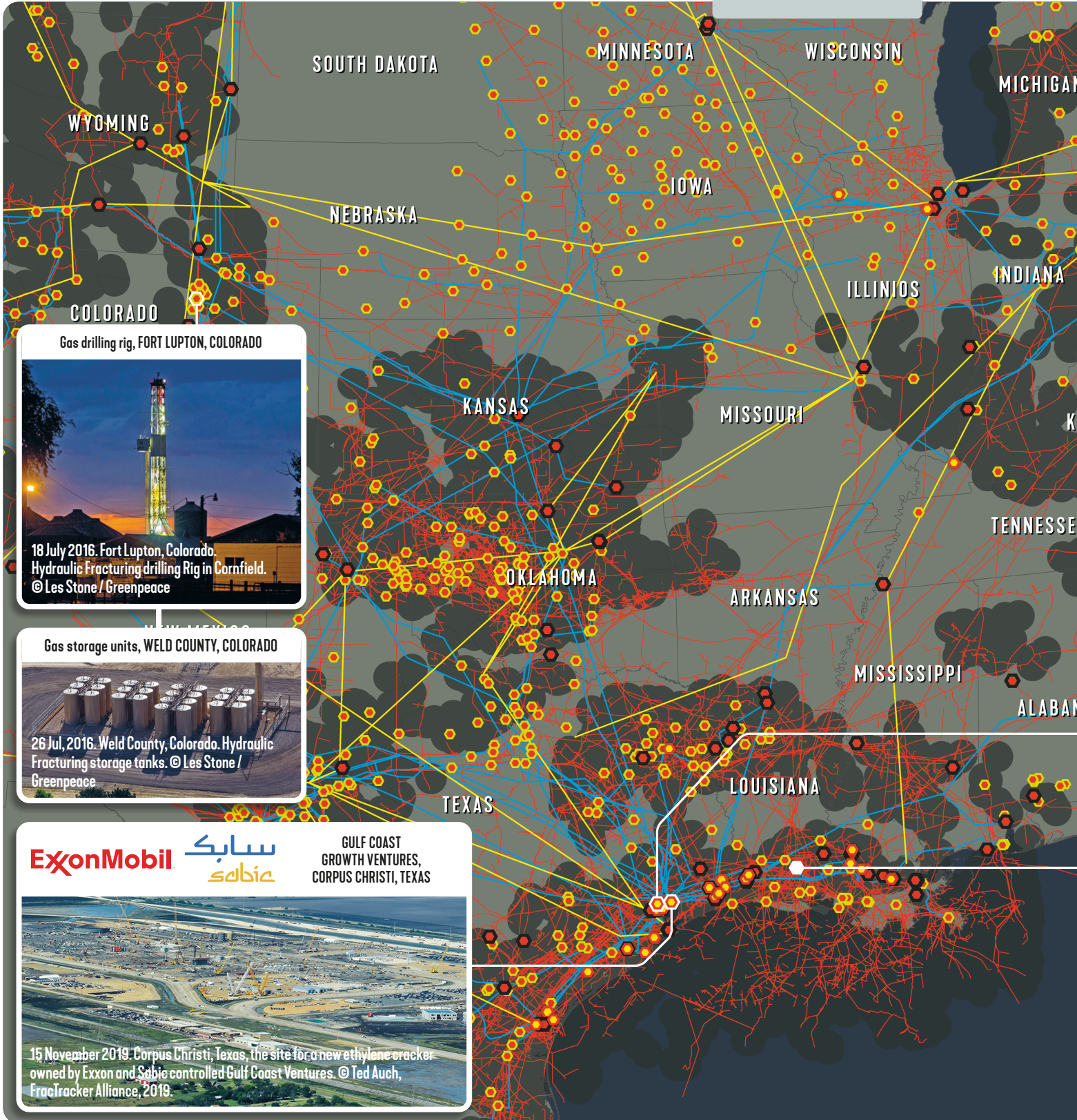
23 December 2016. Reliance Refinery, Jamnagar, India. From https://youtu.be/h1uFDVdR_ug

- 10. OWNER: Nayara Energy
FACILITY: Vadinar, Gujarat, India
CRACKER: 1.8 ethylene
DOWNSTREAM: unspecified PE, PP etc.
DATES: Completion of entire project due 2026
- 11. OWNER: Reliance Industries
FACILITY: Jamnagar, Gujarat, India
CRACKER: 4.1 ethylene and propylene combined. New multi-zone catalytic cracker and converted fluid catalytic cracker: 8.5 ethylene and propylene combined.
DOWNSTREAM: 3.0 PE, 5.2 PP ETC
- 12. OWNER: HPCIL Mittal Energy Ltd
FACILITY: Bathinda, Punjab, India
CRACKER: 1.2 ethylene
DATES: Complete. Start-up due September or October 2021
- 13. OWNER: GAIL/HPCIL
FACILITY: Kokimede, Andhra Pradesh, India
CRACKER: unknown (input capacity 1.2 ethylene)
DATES: Start-up originally scheduled for 2022
- 14. OWNER: PetroChina
FACILITY: Korda, Xinjiang Uygur Autonomous Region, China
CRACKER: 0.8 ethylene
DOWNSTREAM: 0.8 PE
DATES: Commercial start-up due around Q3 2021
- 15. OWNER: Irkutsk Oil
FACILITY: Irkutsk Polymer Plant, Ust-Kut, Irkutsk Oblast, Russia
CRACKER: 0.65 ethylene
DOWNSTREAM: 0.65 PE
DATES: Start-up due 2022
- 16. OWNER: Rosneft
FACILITY: Angrensk, Irkutsk Oblast, Russia
CRACKER: expansion to 0.33 ethylene and 0.21 propylene
DATES: Completion due 2023 or later.
- 17. OWNER: Sibur
FACILITY: Amur Gas Chemical Complex, Svobodny, Amur Oblast, Siberia, Russia
CRACKER: 1.5 ethylene
DOWNSTREAM: 2.0 PE, 0.4 PP
DATES: Start-up due 2024 or 2025.
- 18. OWNER: PetroChina
FACILITY: Yulin, Shaanxi Province, China
CRACKER: 0.8 ethylene
DOWNSTREAM: 0.8 PE
DATES: Commercial start-up due Q3 2021
- 19. OWNER: Linying Petrochemical
FACILITY: Shouguang, Shandong Province, China
CRACKER: 0.75 total
DOWNSTREAM: unspecified PE
DATES: Commercial start-up due around Q3 2021
- 20. OWNER: Wanhua Chemical Group
FACILITY: Yantai, Shandong Province, China
CRACKER: 1.2 ethylene
DOWNSTREAM: unspecified PE and PP
DATES: Not yet announced.
- 21. OWNER: Zhejiang Petrochemical Co. Ltd.
FACILITY: Zhoushan, Zhejiang Province, China
CRACKERS: 1.4 total each
DATES: Start-ups due Q2 and Q4 2021 respectively
- 22. OWNER: Huatui Shengfu
FACILITY: Ningbo, Zhejiang Province, China
CRACKER: 0.6 total
DATES: Start-up due May 2021
- 23. OWNER: Zhejiang Satellite Petrochemical Co.
FACILITY: Linyoung, Jiangsu Province, China
CRACKERS: 1.25 total each
DOWNSTREAM: 0.4 + 0.95 PE
DATES: First cracker and PE plant on-stream March 2021. 2nd cracker and PE plant start-up due 2022.
- 24. OWNER: Gulai Refinery
FACILITY: Zhangzhou, Fujian Province, China
CRACKER: 1.0 total
DOWNSTREAM: 0.8 styrene
DATES: Start-up due Q3 2021
- 25. OWNER: ExxonMobil
FACILITY: Huizhou Petrochemical Complex, Huizhou, Guangdong Province, China
CRACKER: 1.6 total
DOWNSTREAM: unspecified PE and PP.
DATES: Start-up due 2023
- 26. OWNER: Sinopac
FACILITY: Yangpu Economic Development Zone, Heilain Province, China
CRACKER: 1.0 ethylene (?)
DOWNSTREAM: 1.0 total
DATES: Start-up due by October 2022
- 27. OWNER: Long Son Petrochemicals
FACILITY: Long Son Petrochemicals Complex, Long Son Island, Ba Kien-Yun (Lu) Province
CRACKER: 1.0 ethylene, 1.65 total
DOWNSTREAM: 0.45 HDPE [- unspecified LDPE], 0.4 PP.
DATES: Start-up due 2023
- 28. OWNER: Henaji Petrochemical / State of Brunei
FACILITY: Pulau Muara Besar, Brunei
CRACKER: 1.65 ethylene
DOWNSTREAM: 1.05 PE, 1.0 PP.
DATES: Completion due 2023
- 29. OWNER: Lotte Chemical Titan
FACILITY: Lotte Chemical Indonesia New Ethylene (Line), Marak, Banten Province, Java, Indonesia
CRACKER: 1.0 ethylene, 0.6 propylene
DOWNSTREAM: 0.5 PE
DATES: Originally due 2023, but review instigated 2020 due to Covid, with no new date yet announced.
- 30. OWNER: Chondra Asri
FACILITY: Ciligan, Banten Province, Java, Indonesia
CRACKER: 1.1 ethylene
DOWNSTREAM: 0.75 PE, 0.45 PP.
DATES: Start-up due 2024 onwards
- 31. OWNER: Pertamina / CPC
FACILITY: Bojonegara, West Java Province, Indonesia
CRACKER: 1.0 ethylene
DATES: Start-up due 2026
- 32. OWNER: Pertamina / Rasnafi
FACILITY: PT Pertamina Rasnafi Pengolahan dan Petrokimia, Inban, East Java Province, Indonesia
CRACKER: 1.0 ethylene
DOWNSTREAM: 1.2 PP etc.
DATES: Completion due before 2025
- 33. OWNER: Hyundai Oilbank / Lotte Chemical
FACILITY: Odeosan, South Chungcheong Province, South Korea
CRACKER: 0.85 ethylene
DOWNSTREAM: 0.89 PE, 0.5 PP.
DATES: Commercial start-up due before end of 2021
- 34. OWNER: GS Caltex
FACILITY: Yeosu, South Jeolla Province, South Korea
CRACKER: 0.7 ethylene, 0.35 propylene
DOWNSTREAM: 0.5 PE
DATES: Start-up due June 2021
- 35. OWNER: Shell / China National Offshore Oil Corp.
FACILITY: Huizhou, Guangdong Province, China
CRACKER: 1.5 ethylene
DATES: Not announced
- 36. OWNER: LG Chem
FACILITY: Yeosu, South Jeolla Province, South Korea
CRACKER: 0.8 ethylene
DOWNSTREAM: 0.8 PE
DATES: Start-up due July or August 2021

THE U.S.

TOXIC EXPANSION

- Oil Refineries
- Gas Processing Plant
- Ethylene Cracker
- HGL Gas Pipeline
- Oil pipeline
- Gas pipeline
- Oil/Gas Field
- Water

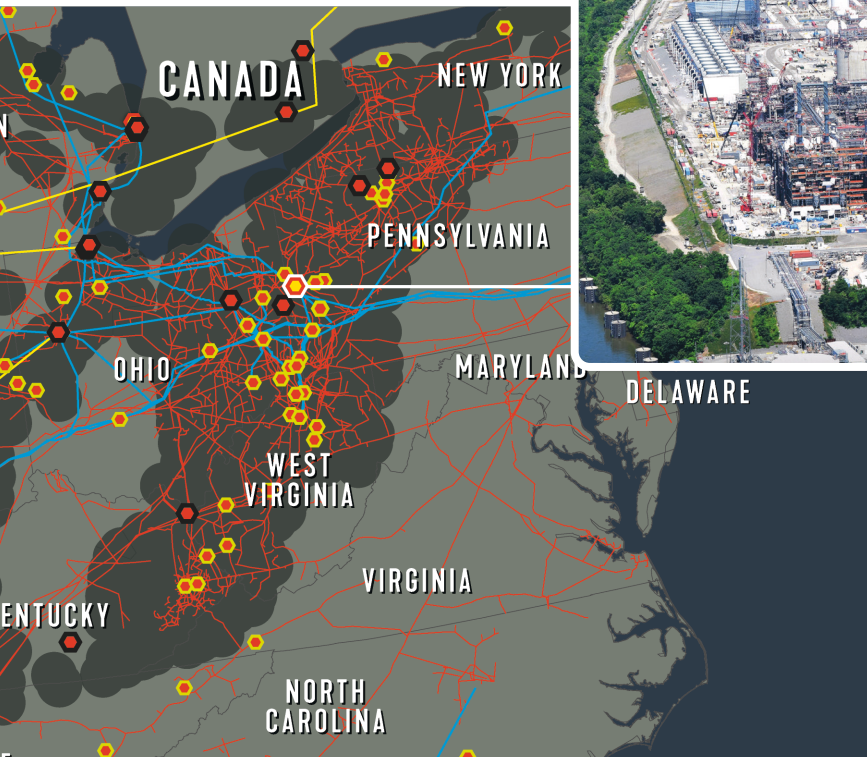




Shell Pennsylvania Petrochemicals Complex,
POTTER TOWNSHIP, BEAVER COUNTY, PENNSYLVANIA



17 June 2021, Beaver County, Pennsylvania. Shell owned cracker plant, © Ted Auch, FracTracker Alliance, 2021.



It is anticipated that North America will remain a key region for petrochemical expansion, with growth driven by the availability of fracked gas from both the Permian⁸⁰ and Appalachian basins.⁸¹

Many facilities have been built in recent years and many more are under construction or planned. For instance Taiwanese company Formosa Plastics aims to build an enormous plastic production complex in St. James Parish.⁸² The complex, planned to be located next to a predominantly Black/African American community, and just a mile from an elementary school,⁸³ has received approval to emit high levels of multiple carcinogens and other harmful pollutants,⁸⁴ Formosa's plant is just one of 88 new petrochemical facilities under construction or planned in the Gulf region.⁸⁵

Further along the Gulf Coast, ExxonMobil's Baytown complex near Houston, Texas, includes an olefins facility, reportedly one of the largest ethylene plants in the world. The facility's history of air quality violations goes back at least to the 1990s, and in the decade to 2019 the Texas Commission on Environmental Quality reportedly fined it 22 times.⁸⁶ Yet despite this history⁸⁷ in 2019 ExxonMobil saw completion of a multibillion-dollar ethane cracker to feed two polyethylene lines that started up in 2017 - all part of its 10-year, \$20 billion "Growing the Gulf" expansion program.⁸⁸

ExxonMobil is also currently engaged in a joint venture with SABIC (a subsidiary of the Saudi state petroleum and gas company Saudi Aramco) to build an ethylene and polyethylene complex (including what is claimed to be the world's largest steam cracker⁸⁹) near Corpus Christi, Texas, due to open in Q4 2021.⁹⁰ Its output will reportedly include packaging materials.⁹¹ The facility's expected high water consumption is increasing pressure for construction of a desalination plant that opponents say may impact marine life and add further climate concerns.⁹²

INEOS Oil refining facility,
LA PORTE, TEXAS



La Porte Texas. Ineos oil facilities. © Aaron Sprecher / Greenpeace

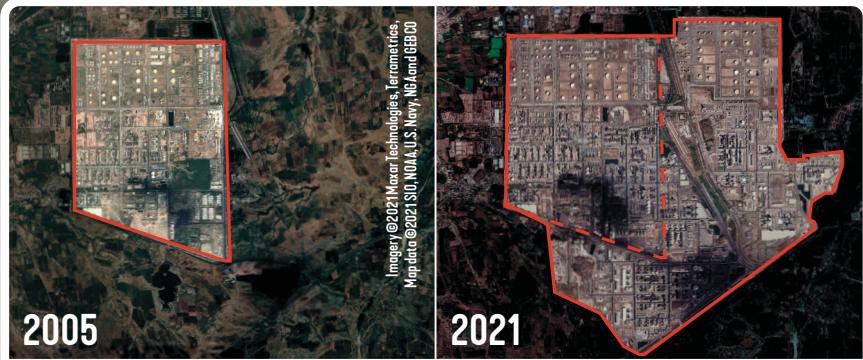
Bayou Bridge gas pipeline, LOUISIANA



31 March 2018, Acadia Parish, Louisiana. Construction on the Bayou Bridge Pipeline. © Julie Dermansky / Greenpeace



Melinda Tilles by Atchafalaya Basin Pipeline Construction. © Julie Dermansky / Greenpeace



Imagery ©2021 Maxar Technologies, TerraMetrics. Map data ©2021 SIO, NOAA, U.S. Navy, NGA and GEBCO

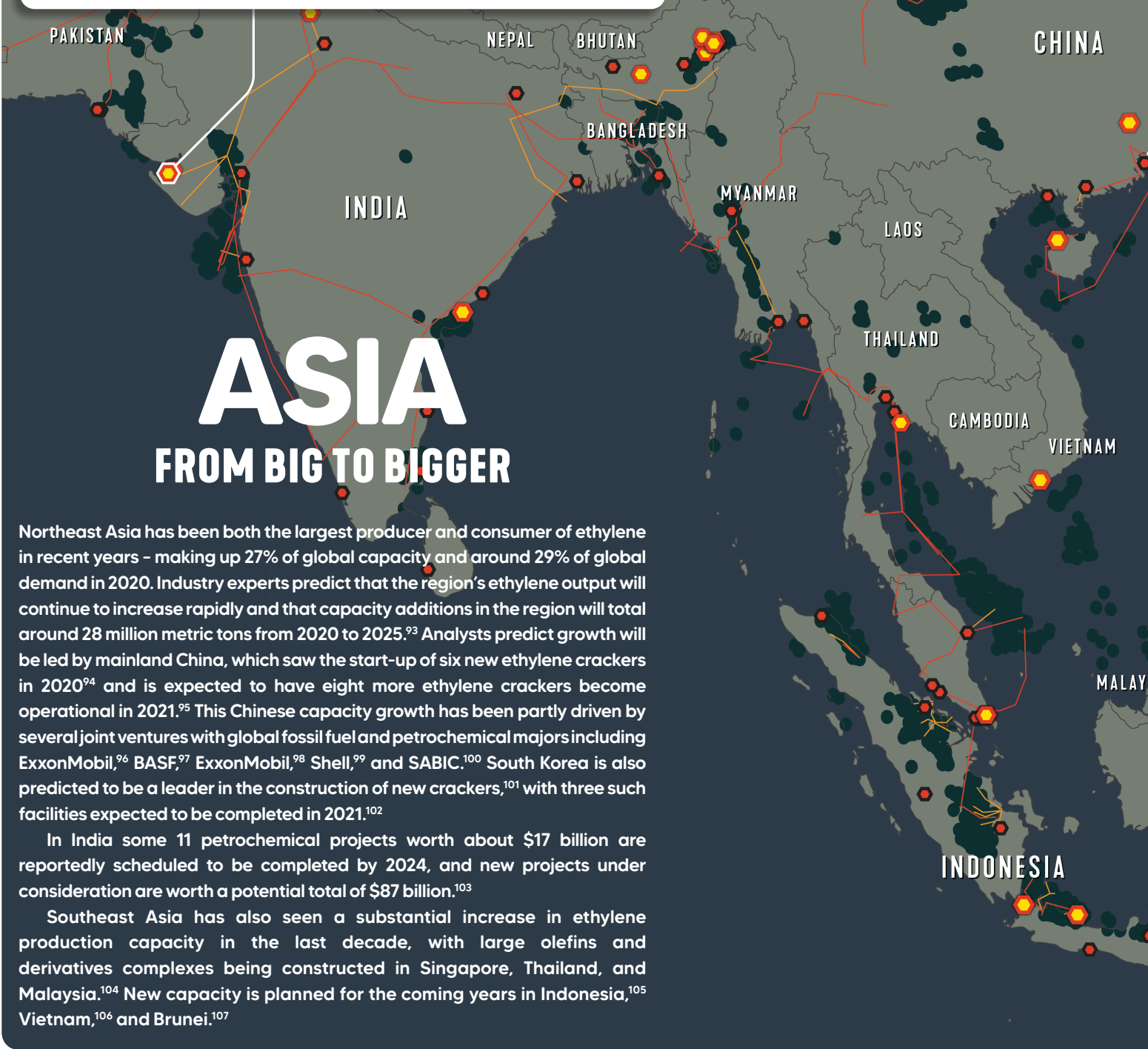
- Oil Refinery
- Ethylene Cracker
- Oil pipeline
- Gas pipeline
- National Borders
- Oil/Gas Field
- Water

2005

2021



JAMNAGAR, INDIA. facility expanded to become the largest cracker in the world



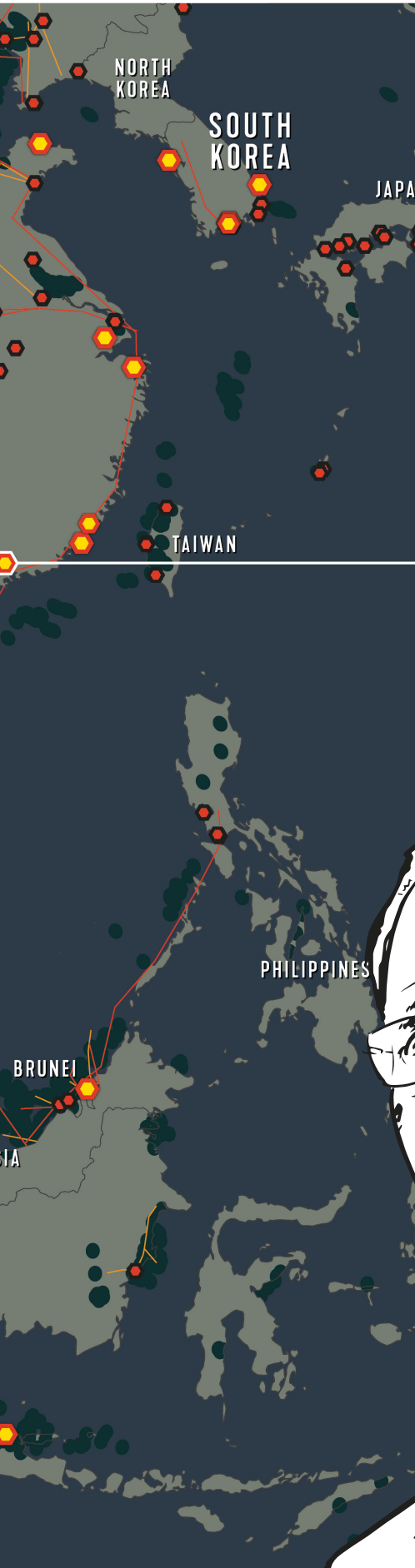
ASIA

FROM BIG TO BIGGER

Northeast Asia has been both the largest producer and consumer of ethylene in recent years – making up 27% of global capacity and around 29% of global demand in 2020. Industry experts predict that the region’s ethylene output will continue to increase rapidly and that capacity additions in the region will total around 28 million metric tons from 2020 to 2025.⁹³ Analysts predict growth will be led by mainland China, which saw the start-up of six new ethylene crackers in 2020⁹⁴ and is expected to have eight more ethylene crackers become operational in 2021.⁹⁵ This Chinese capacity growth has been partly driven by several joint ventures with global fossil fuel and petrochemical majors including ExxonMobil,⁹⁶ BASF,⁹⁷ ExxonMobil,⁹⁸ Shell,⁹⁹ and SABIC.¹⁰⁰ South Korea is also predicted to be a leader in the construction of new crackers,¹⁰¹ with three such facilities expected to be completed in 2021.¹⁰²

In India some 11 petrochemical projects worth about \$17 billion are reportedly scheduled to be completed by 2024, and new projects under consideration are worth a potential total of \$87 billion.¹⁰³

Southeast Asia has also seen a substantial increase in ethylene production capacity in the last decade, with large olefins and derivatives complexes being constructed in Singapore, Thailand, and Malaysia.¹⁰⁴ New capacity is planned for the coming years in Indonesia,¹⁰⁵ Vietnam,¹⁰⁶ and Brunei.¹⁰⁷



Huizhou Petrochemical Complex, Huizhou, Guangdong Province, China. From http://www.xinhuanet.com/english/2020-04/22/c_138999462.htm



ExxonMobil  **SINOPEC**

Huizhou Petrochemical Complex,
HUIZHOU, GUANGDONG PROVINCE, CHINA



"(China is)...an environment that enables ExxonMobil to continue our strategic long-term investments"

DARREN WOODS, CEO EXXONMOBIL

EUROPE

SWITCHING TO US SHALE GAS

- Oil Refineries
- Ethylene Cracker
- Oil pipeline
- Gas pipeline
- Oil/Gas Field

Braskem + INEOS
LA PORTE, TEXAS

La Porte, Texas. Ineos and Braskem oil facilities.
© Aaron Sprecher / Greenpeace



AN INEOS 'DRAGON' SHALE GAS SHIP



JS Ineos Insight shale gas ship carrying ethane gas to Grangemouth.
© Michael McGurk / Alamy Stock Photo

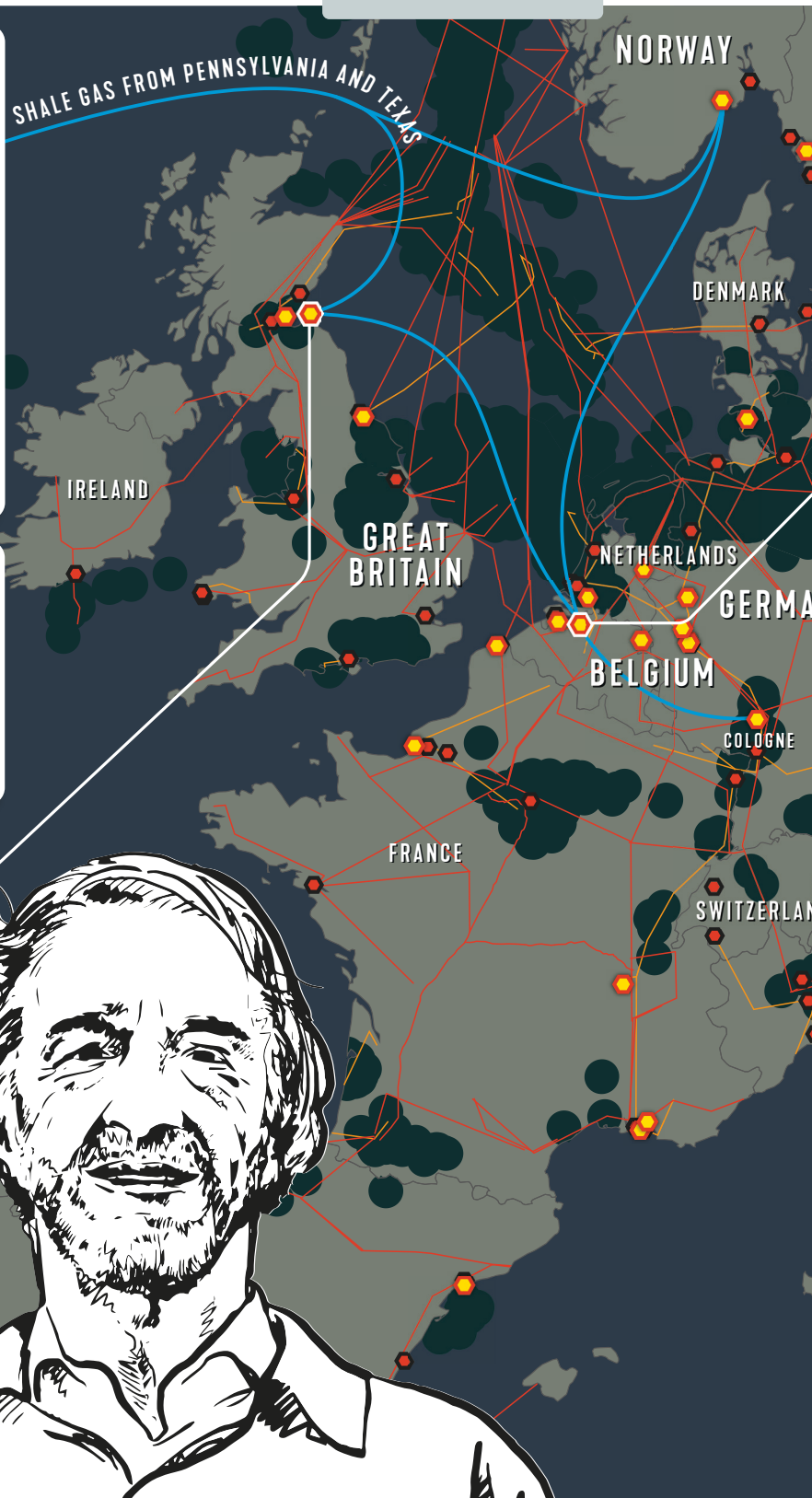
INEOS
GRANGEMOUTH, UNITED KINGDOM



Grangemouth oil refinery and petrochemical complex is the first plant to import ethane from US shale oil. © Quillpen royalty free stock / Alamy Stock Photo

**“I think a lot of opposition
(to fracking) is based on
hearsay and rumour.”**

JIM RATCLIFFE, CEO INEOS



Plastics News

January 15, 2019 01:00 AM

Ineos investing \$3.4B in major European cracker project in Belgium



While major regional expansion is not predicted for Europe, it is likely to remain a key petrochemical producer in coming years. Belgium's Port of Antwerp, which is currently the world's second-largest petrochemical cluster after Houston, sits at the heart of the Western European pipeline network, with dedicated pipeline systems for naphtha, ethylene, and propylene, among others, and serves a multitude of sites.¹⁰⁸ A number of firms are expanding or upgrading their cracking capacity in the region to take advantage of cheap gas feedstocks – including Total, which has upgraded its Antwerp plant,¹⁰⁹ and Borealis, which has been sourcing U.S. ethane for its cracker in Sweden since 2016¹¹⁰ and is building what will be one of the world's largest propylene plants in Antwerp.¹¹¹

Anglo-Swiss chemical giant Ineos, which claims to be Europe's largest ethylene producer,¹¹² has been investing heavily in plans reliant on U.S. fracking. Ineos has developed its own fleet of tankers (the so-called Dragon ships) that began importing U.S. shale gas-derived ethane to Europe in 2016; the firm states that it has invested \$2 billion in its U.S. ethane supply chain, including the ships and infrastructure in the U.S. and Scotland, and it has signed 15-year contracts for U.S. ethane.¹¹³ In October 2020, Ineos announced that it will also import U.S. butane to Antwerp.¹¹⁴ In 2020, Ineos itself obtained its first permits to drill in the Texas shales.¹¹⁵

In 2019, Ineos announced a £3 billion (\$4.10 billion) investment in a new ethane cracker – supposedly the first in Europe for 20 years – and a propylene plant at Antwerp, specifically citing the need to compete with the fracking-driven U.S. petrochemical expansion. Both plants are intended to process U.S. shale gas shipped by Ineos.¹¹⁶ However, in the wake of a delay caused by legal action,¹¹⁷ Ineos suspended construction of the propylene plant in January 2021.



BRINDISI, ITALY
Polyethylene and butadiene
steam-cracking plant,



TO MEET CLIMATE COMMITMENTS AND ALLEVIATE HARM TO COMMUNITIES, CONSUMER GOODS COMPANIES MUST PHASE OUT SINGLE-USE PLASTIC PACKAGING AND SHIFT TO REUSE

Clearly, given the detrimental impacts to communities and the need to keep global temperature rise below 1.5 °C, the fossil fuel industry cannot be allowed to continue expanding petrochemical production to make plastic.

The consumer goods sector has a clear choice to make: Companies can rapidly move away from single-use plastic and seriously invest in reuse systems and package-free products, or they can continue to enable the fossil fuel industry's attempts to ramp up plastic production behind the smokescreen of recycling.

Among progressive businesses, many governments, and nongovernmental organizations, there is a growing consensus that our current linear economic model with its "take, make, dispose" philosophy must be abandoned in favor of a slower circular model that decouples economic activity from the consumption of finite resources and designs waste out of the system. Reuse will be central to such a slow circular economy, with recycling confined mainly to dealing with reusable packaging that has reached the end of its life.

However the big brands featured in this report are lagging far behind. While they have made high-level public pledges

to tackle both plastic pollution and climate change, and talk about the circular economy, in reality they have made little to no progress on either reducing the billions of items of single-use plastic packaging they collectively sell each year, or switching to reusable packaging.¹¹⁸

Instead, most big brands continue to propose plastic recycling as the central solution to the plastic pollution crisis, even though there is abundant evidence of its failure. This is despite the fact that multiple studies have shown that reusing packaging is far less carbon-intensive than relying on single-use packaging. For instance, one life-cycle assessment study estimated that if the glass bottles used in the food and drinks packaging sector were reused by up to three times, it would save approximately 50,000 metric tons of CO₂e per year.¹¹⁹

It's time for these companies to switch direction - to reduce both their dependence on oil and gas and their plastic footprints and move beyond the throwaway culture - by phasing out single-use plastic and instead seriously investing in developing reuse systems and package-free products.¹²⁰ Governments must encourage, assist and, where necessary, compel them to act.



3 March 2021, Washington DC. A supermarket with bulk items, an effort to reduce single use plastics. © Tim Aubry / Greenpeace



20 December, 2020 Lenasia, South Africa. Reusable glass and plastic Coca-Cola bottles. © Dillion Jacobs / Greenpeace



GREENPEACE IS CALLING ON COMPANIES TO TAKE THE FOLLOWING STEPS:

- **Urgently move to reuse systems and package-free products.** Set targets to have *at least* 25% reusable packaging by 2025 and 50% by 2030. *Note: Sectors for which a switch to reuse is comparatively easy – such as soft drinks, mineral water, alcoholic beverages, and coffee chains – should set more ambitious targets.*
- **Commit to collaborating with others to standardize reusable packaging** and build shared reuse systems and infrastructure.
- **Phase out all single-use plastic (packaging and products¹²¹),** not just “virgin” or “new” plastic.
- **Be transparent.** Annually release verified data about your company’s single-use packaging footprint, including single-use packaging reduction rates and reusable packaging uptake. Disclose where plastic used originates and report on the full lifetime climate footprint of packaging production, use, and disposal.
- **Advocate for political action to drive industry-wide transformation.** Promote an ambitious Global Plastics Treaty that addresses the entire life cycle of plastic products and emphasizes reduction. Support regional and national legislation that promotes the slow circular economy and extended producer responsibility, bans single-use plastic, and fast-tracks reuse and packaging-free systems.

GREENPEACE IS CALLING ON LOCAL AND NATIONAL GOVERNMENTS TO TAKE THE FOLLOWING STEPS:

- **Work with the communities that are most impacted** by plastic production, pollution, use, and disposal to ensure that their needs are addressed.
- **Support the development of an ambitious Global Plastics Treaty** that addresses the entire life cycle of plastic and emphasizes reduction.
- **Move toward a zero-waste economy** that reduces waste generation and ensures a green and just transition/recovery and prioritizes workers throughout the entire plastic life cycle.
- **Encourage a phase-out of single-use plastic** via legally binding legislation and policy measures, including extended producer responsibility, and ending fossil fuel subsidies and petrochemical expansion permits.
- Encourage **adoption of reuse and packaging-free systems** via legislation, investment, and policy measures.

19th Judicial District Court, Parish of East Baton Rouge, State of Louisiana. 2020. Petitioners’ brief in support of their petition for judicial review. Served November 5. <https://earthjustice.org/sites/default/files/files/petitioners-brief-formosa-air-permit-appeal.pdf>

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ENDNOTES

- 1 Raval & Ward (2017)
- 2 Baystar, Who we are (Online), Melinek & Hays (2020), Reuters (2020) and Total, Antwerp: Total's largest integrated complex in Europe (Online)
- 3 Global Energy Infrastructure (2021), Loh (2020) and Taylor (2017)
- 4 Brelsford (2021), Chang (2020) and Taylor (2017)
- 5 Article 2, paragraph 1 of the Paris Agreement states: "This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." See United Nations Framework Convention on Climate Change (2015) p.3.
- 6 CIEL (2019) p.8
- 7 Howarth (2019)
- 8 CIEL (2019) p.26. Owing to a lack of data, this estimate excludes the significant contribution of natural gas to plastic production elsewhere in the world, notably in the Middle East.
- 9 CIEL (2019) p.2
- 10 Renewable Carbon Publications (2019). This graphic is based on data from PlasticsEurope and also features in its annual reports; see PlasticsEurope (2013) p.10 and PlasticsEurope (2020) p.16.
- 11 PlasticsEurope (2021)
- 12 World Economic Forum (2016) pp.13-14, drawing on data from the ICIS Supply & Demand database and IEA (2015), suggests a projected growth rate of 3.8% per year from 2015 to 2030 and 3.5% from 2030 to 2050. These figures are endorsed by CIEL (CIEL (2019) pp.17-18).
- 13 CIEL (2019) pp.2, 4-5, 80-81
- 14 CIEL (2019) pp.2, 4-5, 80-81
- 15 Charles *et al.* (2021) p.40
- 16 Researchers estimate that as of 2015, 42% of primary nonfiber plastics produced worldwide was for packaging. See Geyer *et al.* (2017) p.2.
- 17 International Energy Agency (2018) pp.1,3
- 18 Coca-Cola (2021) p.70
- 19 Ellen MacArthur Foundation (2020)
- 20 ExxonMobil, Packaging (Online)
- 21 Powell *et al.* (2020)
- 22 The rankings shown here are from Powell *et al.* (2020) p.14.
- 23 Geyer *et al.* (2017) pp.2-3
- 24 Geyer *et al.* (2017) p.3
- 25 The Ellen MacArthur Foundation has estimated that in 2013, of an estimated 14% of plastic packaging collected for recycling globally, only 2% was recycled back into similar-quality applications. See Ellen MacArthur Foundation *et al.* (2016) pp.26-27.
- 26 In 2018 2.2% of U.S. post-consumer plastic waste was recycled domestically, with a further 3% being exported purportedly for recycling. Source: Dell (2019).
- 27 Greenpeace USA (2020)
- 28 American Chemistry Council (2020)
- 29 Tullo (2018)
- 30 Nestlé Waters US, Home (Online)
- 31 Keep America Beautiful, Board of Directors (Online)
- 32 Sullivan (2020)
- 33 PLASTICS, Our rebrand (Online)
- 34 Buranyi (2018)
- 35 Frontline/NPR (2020), Meadows (1992)
- 36 Sullivan (2020)
- 37 See Howard (2020) and Tabuchi *et al.* (2020).
- 38 The Society of the Plastic Industry has since taken over from the ACC as the parent organization of the Progressive Bag Alliance, which under the new name American Progressive Bag Alliance continues to oppose plastic bag laws. See Romer (2019) p.20.
- 39 American Chemistry Council (2020)
- 40 American Chemistry Council (2018)
- 41 IPCC (2018) p.12
- 42 Recycling Partnership, Funders (Online)
- 43 See Bottle Bill Resource Guide, What is a bottle bill? (Online), Changing Markets Foundation (2020) p.93, Container Recycling Institute (2009) slides 2, 9, 19, Corkery (2019) and Recycling Partnership (2019) pp.10-14, 46.
- 44 Of the fossil fuel and petrochemical companies featured in the supply chain graphic (Figure 4) of this report, Braskem, Chevron Phillips, Dow, Eni, Versalis, ExxonMobil, Formosa, SABIC, Shell and Total are members of the Alliance. See Alliance to End Plastic Waste, About (Online).
- 45 Alliance to End Plastic Waste (2021), Alliance to End Plastic Waste, Our work (Online)
- 46 Total (2019)
- 47 Paben (2018), Peters (2019)
- 48 Paben (2018)
- 49 PureCycle Technologies (2019b)
- 50 PureCycle Technologies (2019b)
- 51 Total (2020)
- 52 PureCycle Technologies (2019a)
- 53 Robbins Geller Rudman & Dowd LLP (2021)
- 54 Concerned Health Professionals of NY & Physicians for Social Responsibility (2019) p.19
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- 120 Greenpeace USA does not in general consider the replacement of single-use plastic packaging with single-use packaging made of other materials such as paper, card, glass, or metal – even when recyclable – to be a satisfactory solution to the problems created by plastic, as this has the potential in its own right to exacerbate climate change and other environmental crises. See e.g. Greenpeace USA (2019) pp.7-8.
- 121 Excludes essential single-use plastic medical equipment such as plastic syringes and tubing.

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2 March 2019, Dumaguete, Philippines.
Plastic waste dump.
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Greenpeace is a network of global, independent campaigning organizations that use peaceful protest and creative communication to expose global environmental problems and promote solutions that are essential to a green and peaceful future.

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Front: The sun sets behind Total's Culzean Platforms located in the Culzean Field. Culzean is a gas condensate field located in the British North Sea, 230 kilometres off the coast of Aberdeen.
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This page: 22 April 2020, Poland. The largest fire in the history of the Biebrza National Park is a result of drought, one of the most severe effects of the climate crisis in Poland.
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