Oceans Awash in Toxic Plastic

Brought to You by the Fracking Industry

Hydraulic fracturing (fracking) is powering a dangerous plastics bonanza. The plastics and fracking industries rely on one another to prop up their polluting business models. The fracking industry needs a new demand source to sop up excess gas to justify more drilling,[1] and the plastics industry needs a source of low-cost ethane, a fracking byproduct used to manufacture plastics.[2] Much of the fracking-driven resurgent plastics production ends up polluting the oceans.

The process of turning fracked gas into plastic releases climate-altering air pollutants,[3] while increased plastics manufacturing means more disposable plastic materials that pollute our air, water and even table salt.[4] Continued plastics production will leave a toxic legacy that threatens ocean ecosystems and human health.[5] Much of this plastic waste ends up in our oceans and surface waters, resulting in potentially irreversible destruction to aquatic habitats.[6]

The symbiotic relationship between fracking and plastics

The rapid fracking expansion created a gas glut that drove real natural gas prices to the lowest levels in decades,[7] but the plastics industry is riding to the rescue of the fracking industry. According to *Plastics News,* fracking "represents a once-in-a-generation opportunity" for the plastics industry.[8] A renewed push for plastics manufacturing provides the fracking industry with a polluting partner to absorb the ever-increasing quantity of fracked gas.[9]

Investors are lining up to build new factories that transform fracking byproducts into plastics.[10] Since 2012, chemical companies have been aggressively investing in petrochemical plants to tap the gas glut.[11] These facilities convert gas byproducts into petrochemicals to manufacture products, primarily plastics.[12]

This fracking-driven plastic pollution has a global reach. More than half of the new raw plastics produced in the United States are slated for export.[13] For example, the United Kingdom-based chemical giant Ineos has teamed up with the U.S. fracking industry to fuel European plastics factories.[14] The controversial Mariner East pipeline system delivers ethane to the Marcus Hook export terminal in Pennsylvania, then large "dragon ships" deliver the fracked-gas byproducts across the Atlantic Ocean to Ineos' European facilities.[15]

Fracking, plastics manufacture, climate change and ocean acidification

Plants that convert natural gas into petrochemicals emit massive amounts of air and climate pollutants, including carbon dioxide (CO_2) and nitrogen oxide.[16] This can exacerbate ocean acidification, caused when rising CO_2 levels in the atmosphere alter seawater chemistry.[17] Some sea life shows decreased rates of survival and growth, higher rates of deformities and even behavioral changes in acidified waters.[18] This could have far-reaching implications for the abundance and biodiversity of marine life, as well as for ecosystem health and resiliency.[19] Coral reefs serve as the foundation for many ocean food webs. Studies have shown that increasing acidity dissolves coral skeletons, making it harder to form new reef structures.[20]

The emissions from petrochemical plants and fracked-gas power plants are harmful to human health and accelerate the acidification of the ocean.[21] Continued fracking and buildout of natural gas infrastructure like the Mariner East 2 pipeline will lock in future CO_2 emissions, delaying a transition to clean energy alternatives.

Plastic pollution is toxic and has a growing footprint

Fracked gas is supercharging the plastics industry, contributing climate-altering emissions and even more unnecessary plastic. The global plastics industry is expected to increase production 40 percent over the next decade, driven by dropping prices for manufacturing inputs like fracking byproducts and by massively scaled-up production.[22] Most of the plastics industry manufactures packaging — materials that are immediately discarded.[23] Worldwide, each person disposes of 110 pounds of plastic annually.[24] Since 1950, the industry has produced 18.3 trillion pounds of plastics, and only about 9 percent was recycled — meaning that more than 16 billion pounds have been tossed into landfills, littered into the environment or incinerated.[25]

Additionally, plastic products are inherently toxic and can become a vehicle for other pollutants.[26] Many plastics contain hazardous chemicals and thousands of different additives, which may leach out as the plastic ages.[27] These risky additives can make up half of plastic by weight.[28] Some are extremely noxious, many have been linked to chemical toxicity, and some are classified as endocrine disruptors, which can alter hormone function.[29] These additives can seep from plastics into food and the environment, accumulating over time.[30]

Once created, plastic lasts for hundreds to thousands of years, and the toxic remains of plastic pose serious challenges.[31] Discarded plastic fills up increasingly limited landfill space.[32] As water percolates through these landfills it picks up toxins, generating super-polluted runoff that is harmful to human health and the environment.[33] Recycling facilities may also release dangerous plastic chemical additives into the environment.[34]

Massive amounts of plastic trash inundate our oceans

Forty percent of all plastic waste is unaccounted for, and a large volume of plastic waste enters the ocean where it remains for decades.[35] In 2010 alone, nearly 200 coastal countries generated over 600 billion pounds of plastic waste, with 11 billion to 28 billion pounds ending up in the oceans.[36] This litter constantly accumulates in colossal plastic garbage masses floating in our oceans.

Studies have found microplastics — tiny plastic fragments degraded from plastic litter — in open oceans, freshwater sources, lake sediments, river beds and the deepest ocean trenches.[37] While large plastic waste is easiest to see, ingesting small microplastics is extremely harmful to aquatic life and seabirds.[38] Microplastic ocean pollution is widespread. Between 2007 and 2013, an estimated 538 million pounds of plastic particles were found on the oceans' surface — from coastal Australia to the Mediterranean Sea.[39]

In the Pacific Ocean, four major ocean currents have concentrated this waste into a slow-moving "plastic soup."[40] Dubbed the Great Pacific Garbage Patch, the world's largest dump is four times the size of California.[41] Many discarded plastics join this rapidly growing, floating mass of trash — one of five gigantic plastic ocean trash heaps.[42]

Plastics increasingly threaten important aquatic ecosystems

Plastic contamination poses a significant threat to marine biodiversity, impacting over 600 marine species.[43] Frequently plastic debris floats at the ocean's surface, mixing with food sources, where it entangles, chokes or is consumed by wildlife.[44]

Large chunks of plastic have accumulated in whales' stomachs, causing them to starve to death.[45] Sea turtles, including critically endangered leatherbacks, accidently consume plastic bags, mistaking them for jellyfish.[46] And scientists have found plastic pellets in endangered puffins' stomachs.[47]

Microplastics cause liver toxicity in fish, accumulate toxic chemicals in the fat tissue of sea birds, impair cell function in mussels and kill sea urchin embryos.[48] As larger animals eat smaller ones, these toxins move up the food chain and bioaccumulate in larger marine life, posing serious systemic risks.[49]

Seat turtles may accidentally consume plastic bags, which can be mistaken for jellyfish. PHOTO CC-BY-SA © MICHAELISSCIENTISTS / COMMONS.WIKIMEDIA.ORG

Plastic pollution may damage irreplaceable parts of the global carbon cycle

Plastic pollution can contribute to potentially catastrophic impacts on ocean ecosystems.[50] The ocean plays a critical role performing half of the planet's photosynthesis — absorbing massive amounts of carbon — but plastic pollution threatens oceans' carbon sequestration.[51] Large quantities of plastic can block light and hinder algae photosynthesis.[52] While photosynthesis at the ocean's surface pulls carbon from the atmosphere, large amounts of the carbon will re-enter the atmosphere unless sequestered deeper in the ocean.[53]

Many animals comprise the "biological pump" that removes more than 10 billion tons of this carbon from the surface ocean annually.[54] Critical to this process are 22 trillion pounds of surface-feeding, plankton-eating fish that subsequently bring the carbon to the ocean depths.[55] These fish account for over 40 percent of the carbon sequestration in some parts of the ocean.[56] Unfortunately, these fish are now consuming large amounts of plastic, which potentially disrupts this natural sequestration process.[57] Microplastics also interfere with smaller carbon sequesterers such as zooplankton, preventing carbon-rich debris from sinking.[58]

Microplastics end up everywhere, pollute everything

Microplastics are ubiquitous, finding their way into the food we eat and the air we breathe.[59] Even indoor air can have high concentrations of microplastics from household products and synthetic textiles, which accumulate in people's lungs after being inhaled.[60] In the United States, the Clean Water Act generally does not regulate small debris under 5 millimeters, such as microplastics, and wastewater treatment systems do not always remove plastic fragments from water.[61] Microplastics are present in soil and contaminate organic fertilizers.[62] Plastic particles have been found in tap water, beer and sea salt, and one study even found them in 93 percent of bottled water.[63] In Europe, shellfish consumers eat as many as 11,000 microplastic particles every year.[64]

Conclusion

The fracked plastics economy generates vast volumes of pollution that directly impact the climate and overburdened oceans. We must stop producing more unnecessary and unsustainable plastics. A first step would be to correctly classify plastic waste as hazardous.

Natural gas is a cheap but dirty fossil fuel. The toxic fracking legacy is now spreading through the expansion of petrochemical and plastics plants. The drive to build more fracked gas infrastructure like pipelines and power plants also supports an unnecessary and wasteful plastics boom that will expose people and the environment to toxic pollution for generations to come. Rather than continually investing in fossil fuels and chemical industries, we must invest in clean, renewable energy.

Consumers need to understand that using plastic props up the polluting and climate-destroying fracking industry. People can help secure a sustainable future by making more conscientious shopping decisions. People should limit their purchases of plastic products, an activity that effectively supports and finances the oil and gas industry.

Endnotes

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