environmental investigation agency

Ocean CoP26 Briefing

Turning off the Tap

Plastic production and the climate emergency

November 2021

Introduction

In 2015, plastic production emitted more than a billion tonnes (Gt) of carbon dioxide equivalent (CO_2e).[1]

The expected expansion of plastic production will emit greenhouse gases (GHG) equivalent to an estimated 56 Gt CO_2e between 2015-50, representing 10-13 per cent of the entire remaining carbon budget.[2]

Addressing plastic production is therefore a climate priority and the adoption of a new global plastics treaty which promotes a circular economy for plastics and controls plastic production is a key climate strategy.

Where does plastic come from?

Virtually all plastic – 99 per cent – is made from fossil fuels, predominantly oil and gas.[3]

Producing plastic from oil and gas comprises multiple stages, with the typical production pathway entailing the following:

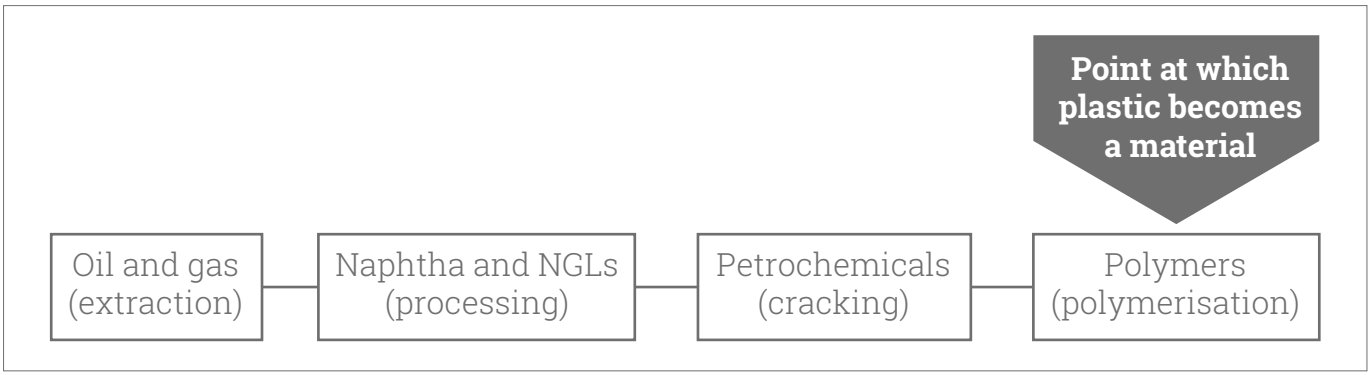
- **Extraction.** Oil and gas must first be extracted from the ground. Depending on the geological layers, oil and gas wells produce varying yields of naphtha and natural gas liquids (NGLs), such as ethane and propane, as components of the extracted oil and gas;
- **Processing.** Oil and gas are then processed using various techniques to separate out naphtha and NGLs. Naphtha is produced from oil through fractional distillation. The oil is heated in a furnace and then sent to a distillation, unit where it separates into lighter components, one of which is naphtha. NGLs are produced from gas through refrigeration or cryogenic turbo-expansion, whereby the gas is cooled to between -34°C and -84°C, causing the NGLs to condense into liquid and separate from the other gases, such as methane;
- **Cracking.** Once processed out, naphtha and NGLs are used as raw materials to produce petrochemicals. Petrochemicals are commonly produced through a process called cracking. Industrial facilities use steam and intense heat in the absence of oxygen to break down the substances into monomers, typically

at around 850°C. For example, naphtha and ethane break down into ethylene while propane breaks down into propylene. Both ethylene and propylene are monomers, also called olefins;

- **Polymerisation.** To create plastic, ethylene and propylene are then polymerised into polyethylene and polypropylene, which are the two most common plastic polymers in use today, constituting more than half of all plastic produced.[4] Many other types of plastics are also produced through polymerisation.

According to the International Energy Agency (IEA), petrochemicals account for 14 per cent and eight per cent of total demand for oil and gas, respectively, and will soon become one of the world's biggest drivers of oil demand.[5]

Figure 1: *The four main industrial processes used to create plastics.*



How does plastic production contribute to methane and carbon dioxide emissions?

Plastic production contributes to GHG emissions at each phase of its production pathway:

- **Methane (CH4).** Most methane emissions associated with oil and gas occur during extraction and processing through venting, leakage and inefficient flaring – referred to as 'methane slip'. Methane is also emitted at abandoned and unused oil and gas wells unless sealed or captured for subsequent use, which is often not the case. Methane is the second most important greenhouse gas, 86 times more powerful than carbon dioxide over a 20-year period, contributing to one-quarter of global warming experienced today.[6]
- **Carbon dioxide (CO2).** Extraction, processing, cracking and polymerisation are energy-intensive industrial activities. Extracting oil and gas emits CO2 during the operation of engines, turbines and other equipment. Processing requires extreme temperatures to heat the oil and cool the gas via fractional distillation and refrigeration or cryogenic turbo-expansion. Cracking requires extreme heat to break down naphtha and NGLs into petrochemicals. Polymerisation requires high volumes of electricity, which is predominantly fossil fuel generated.

What are current trends in plastic production?

Plastic production has grown exponentially and without international intervention will continue to do so.

In 1950, 1.5 million tonnes of plastic were produced globally,[7] increasing to 322 million tonnes in 2015[8] and 368 million in 2019.[9] Plastic production volumes have increased each year to 2019 – the pandemic resulted in a slight drop in 2020 – with more than half of the 10 billion tonnes ever produced having been produced since 2005.[10]

If current trends continue unabated, annual plastic production is set to double again by 2040[11] and increase to 2,000 million tonnes per year by 2050.[12] Although data on plastic consumption across regions is notoriously limited, estimates find lower-income countries consume as little as 4kg per capita while higher-income countries consume about 55-80kg per capita.[13]

There are relatively few plastic producers, approximately 300 worldwide, with about 100 of them accounting for 90 per cent of all single-use plastics.[14]

How can a global plastics treaty reduce greenhouse gas emissions?

Plastic production is increasingly recognised as having reached unsustainable levels.

This has been driven, at least in part, by the oil and gas industry turning to plastic to hedge against the possibility that a serious climate response will reduce demand for their products in the energy sector.[15]

This daunting picture is set against a backdrop of chronic plastic waste mismanagement, resulting in the accelerating accumulation of plastic pollution in marine and other environments.

In response, the international community is set to consider a draft resolution co-authored by Rwanda and Peru to convene an intergovernmental negotiating committee (INC) at the in-person 5th Session of the United Nations Environment Assembly (UNEA-5.2) in February/March 2022, tasked with preparing a legally binding international instrument on plastic pollution – a new global plastics treaty.[16]

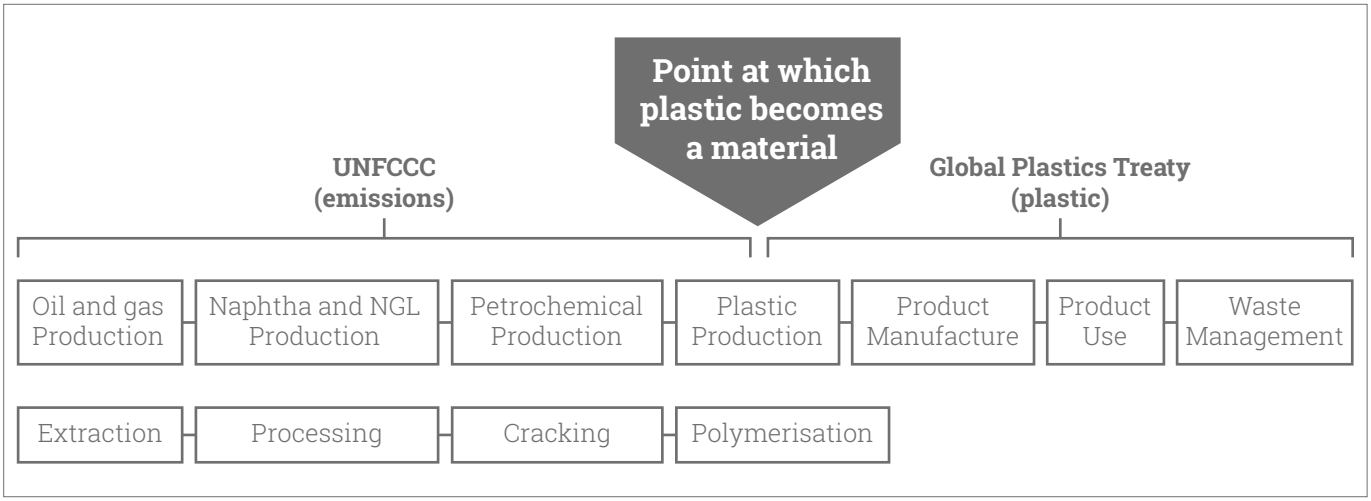
If designed correctly, the new global plastics treaty can significantly reduce the climate impact of plastics. This will require placing within its scope both promoting a circular economy for plastics and controlling plastic production.

- **Circular economy for plastics.** Promoting a circular economy for plastics will require additional measures beyond those to manage plastic waste to ensure that plastic flows in a closed loop rather than being used once and then discarded, landfilled or incinerated. Such additional measures that can enhance resource efficiency and reduce demand for virgin plastic include product design for reuse and recyclability, prevention of single-use plastic products and packaging, restrictions on harmful additives, creation of secondary markets for recycled plastics and investments in separate collection and recycling infrastructure.

- **Plastic production.** Controls on plastic production will also be needed to reduce the supply of virgin plastic to sustainable levels and prevent overwhelming all interventions further downstream intended to promote a circular economy. It is no coincidence that the Montreal Protocol on Substances that Deplete the Ozone Layer, which took such an approach to control the virgin production of ozone-depleting substances (ODS) and, more recently, hydrofluorocarbons (HFCs), is widely considered the most successful multilateral environmental agreement. Applied to plastic production, such controls would indirectly reduce the need for extraction, processing, cracking and polymerisation – resulting in reductions in methane and carbon dioxide emissions from those activities while enhancing the measures to promote a circular economy.

Importantly, promoting a circular economy for plastics and controlling virgin plastic production does not encroach upon the remit of the United Nations Framework Convention on Climate Change (UNFCCC) and associated agreements. Indeed, by regulating plastic when it comes into existence as a material, the new global plastics treaty offers a way to align the international governance of plastic with ongoing efforts to reduce GHG emissions under the UNFCCC and ensure we do not squander these precious years at the critical, defining moment in our collective struggle to limit global warming to 1.5°C.

Figure 2: *Key stages in the fossil fuel and plastic lifecycles with corresponding governance responsibility.*



What can Parties do at CoP26 and beyond?

In November 2021, the world's leaders will meet in Glasgow for the 26th Conference of the Parties (CoP26) to the UNFCCC where the future global climate policy agenda will be decided.

- **Nationally Determined Contributions.** We call on Parties to work toward reducing the climate impact from extraction, processing, cracking and polymerisation via targeted measures in their Nationally Determined Contributions to reduce the methane and other GHG emissions from those activities, in tandem with the rapid phase-out of fossil fuels in the energy sector.
- **Peru and Rwanda Resolution at UNEA-5.2.** We call on UNEA Member States to support the convening of an intergovernmental negotiating committee (INC) to develop a new global plastics treaty at UNEA-5.2 in February/March 2022, one with a mandate to design a legally binding instrument that addresses the full lifecycle of plastic, beginning with plastic production when plastic comes into existence as a material, as proposed in the draft resolution co-authored by Peru and Rwanda.

For more information

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