UNRAVELING THE INTERPLAY: PLASTIC LIFE CYCLE, PLASTIC WASTE MANAGEMENT, AND CLIMATE CHANGE

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I. INTRODUCTION

In an era with a multitude of environmental concerns, the intricate interplay of plastic production, plastic disposal systems, and the overarching issues of climate change have emerged as a pressing global challenge. While plastic provides versatility, convenience, and durability, its hidden costs pose an alarming predicament. These costs contribute to greenhouse gas emissions and exacerbate climate change.

Exploring further how plastic contributes to climate change through production and disposal reveals that the material generates a cascade of greenhouse gases. These include carbon dioxide, methane, and nitrous oxide, all of which detrimentally impact our planet's climate balance. The emissions associated with plastic are not limited to its production but also extend to its end-of-life management system. The disposal of plastic through recycling, incineration, and landfills releases an abundance of these potent pollutants, compounding the challenges posed by climate change.

While these challenges are often examined separately, this research highlights the urgency of addressing the connections between plastic and climate change to create a sustainable and eco-friendly environment. It investigates the synergy between plastic production, disposal practices, and the broader climate crisis, underscoring the interdependence of these issues.

Additionally, this research paper delves into several key recommendations or potential solutions, including the creation of a comprehensive global treaty or policy for regulating plastic pollution, promoting zero-waste policies and embracing a circular economy, banning single-use plastics, ending plastic subsidies, and mandating the extended producer responsibility policy. These measures are explored to develop more comprehensive and effective strategies to

address the environmental crises of our time, reduce plastic pollution, and mitigate climate change. By implementing these measures, we can transition towards a future where plastic is either holistically eliminated or serves its intended purpose without compromising the health of our planet and the well-being of current and future generations.

II. PLASTIC AND ITS LIFE CYCLE

Plastic is one of the most widely used materials in our world today. According to projections, we currently manufacture approximately 438 million tons of new plastic each year, with this figure expected to surge to 35 billion tons by 2050.[1] Plastic has become an integral part of our daily lives, found in various products such as packaging, clothes, and electronics. While plastic offers many benefits, including versatility, durability, and cost-effectiveness, it also has a significantly adverse impact on our environment. This impact is mainly due to its contribution to climate change through plastic production and disposal systems.

Plastics are "synthetic polymers produced by the polymerization reaction of monomers, which are mainly derived from gas and oil extraction."[2] These raw materials, notably fossil fuels such as crude oil, gas, and coal form the basis of plastic production.[3] The plastic life cycle encompasses the extraction of raw materials, their refinement and manufacturing, and finally, recycling or disposal.[4] The production of plastic begins with the extraction of fossil fuels, a process that releases substantial greenhouse gases into the atmosphere at each stage.[5] Two main methods are used for fossil fuel extraction: mining and

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[1] *What Do Plastics Have to Do With Climate Change?*, UNITED NATIONS DEV. PROGRAMME (Nov. 15, 2022), https://stories.undp.org/what-do-plastics-have-to-do-with-climate-change (on file with the Touro Law Review).

[2] Shivika Sharma et al., *Contribution of Plastic and Microplastic to Global Climate Change and Their Conjoining Impacts on the Environment – A Review*, 875 SCI. TOTAL ENV'T, June 1, 2023, https://pubmed.ncbi.nlm.nih.gov/36889403/ [https://doi.org/10.1016/j.scitotenv.2023.162627].

[3] *Id*.

[4] Nina Tsydenova & Pawan Patil, *6 Reasons to Blame Plastic Pollution for Climate Change*, WORLD BANK BLOGS (Nov. 9, 2021), https://blogs.worldbank.org/end-povertyinsouthasia/6-reasons-blame-plastic-pollution-climate-change (on file with the Touro Law Review).

[5] Helen V. Ford et. al., *The Fundamental Links Between Climate Change and Marine Plastic Pollution*, 806 SCI. TOTAL ENV'T, Feb. 1, 2022, https://pubmed.ncbi.nlm.nih.gov/34583073/ [https://doi.org/10.1016/j.scitotenv.2021.150392].

drilling.[6] Mining involves "digging, scraping, or otherwise exposing buried resources…often result[ing] in huge volumes of excess rock and soil being dumped into adjacent valleys and streams, affecting marine life and water flow."[7] Drilling, on the other hand, involves extracting gas and oil from the Earth's core.[8] This is done using pressurized liquid to create cracks in deeply layered rocks, releasing natural gas.[9] This process leads to direct emissions of methane and carbon dioxide, which contribute to global temperature rise. [10] Furthermore, the energy-intensive processes required for oil extraction emit significant amounts of greenhouse gases. [11]

After fossil fuel extraction, raw materials are transported to a refinery and broken down into their building blocks for plastic production, such as ethane from crude oil and propane from natural gas.[12] Subsequently, these building blocks undergo a process called cracking, where they are further broken down into smaller molecules, such as from ethane to ethylene and propane to propylene.[13] During the manufacturing phase, the crude oil is converted into petroleum products, including "transportation fuels, fuel oils for heating and electricity generation, asphalt and road oil, and feedstocks for making the chemicals, plastics, and synthetic materials."[14] This process involves the use of "high heat and emit[s] significant carbon dioxide into the environment."[15] Such emissions contribute to a predicted 34% increase in carbon dioxide emissions by 2030.[16]

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[6] Natalia Brown, *The Life Cycle of Plastics*, DEBRIS FREE OCEANS, https://debrisfreeoceans.org/the-life-cycle-of-plastics/ (on file with the Touro Law Review) (last visited Nov. 26, 2023).

[7] *Id.*

[8] Sharma et al., *supra* note 2.

[9] *Id.*

[10] *Id.*

[11] *See generally*, Lisa Anee Hamilton & Steven Feit, *Plastic & Climate: The Hidden Costs of a Plastic Planet*, CTR. FOR INT'L ENV'T L., May 2019, https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf (on file with the Touro Law Review).

[12] Brown, *supra* note 6.

[13] *Id*,

[14] U.S. ENERGY INFO. ADMIN., *Frequently Asked Questions*, (Mar. 28, 2024), https://www.eia.gov/tools/faqs/faq.php?id=41&t=6#:~:text=Petroleum%20products%20include%20transportation%20fuels,in%20nearly%20everything%20we%20use (on file with the Touro Law Review).

[15] Sharma et al., *supra* note 2.

[16] *Id.*

Once plastics have been used or consumed, they are disposed of in several ways. Some are collected and sorted through a waste management system for recycling, but the majority are incinerated, sent to landfills, or littered into the environment, where they slowly degrade and release methane.[17] A subsequent section of this paper will delve into the intricacies of these specific disposal systems, exploring their components, functionalities, and impacts. The focus of the disposal stage of the plastic life cycle is on reducing plastic waste, improving recycling rates, and developing more sustainable materials.

In conclusion, plastic has undoubtedly revolutionized various aspects of our lives, offering convenience, versatility, and affordability. However, the exponential growth in plastic production and consumption has led to significant emissions of greenhouse gases that contribute to climate change issues. To help preserve our environment and the climate, it is imperative to reduce plastic production and consumption, focusing on the development of sustainable alternatives.

III. PLASTIC WASTE MANAGEMENT

A waste management system handles, minimizes, reuses, recycles, and prevents waste.[18] Its primary objective is to reduce adverse impacts on the environment and human health. Managing plastic disposal is a complex challenge involving various methods, each with its own set of advantages and drawbacks. These methods encompass recycling, incineration, and landfills.

From 1950 to 2015, plastic production "surged from 2 to 380 megatons…[but only] approximately 9% of plastic debris had been recycled, 12% was incinerated, and about 79% of plastic was collected in landfills."[19] Recycling, also known as renewing and reusing, involves converting waste into raw materials that can be used in other products.[20] The recycling process, also referred to as mechanic recycling, includes "collecting waste plastics, sorting, or arranging plastics into categories, washing to remove impurities, shredding and resizing,

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[17] *What Really Happens to Your Plastic "Recycling"*, PLASTIC POLLUTION COAL. (Mar. 18, 2025), https://www.plasticpollutioncoalition.org/blog/2022/5/16/what-really-happens-to-your-plastic-recycling (on file with the Touro Law Review)

[18] Jaruis Andales, *Waste Management System: A Guide*, SAFETY CULTURE (Feb. 14, 2025), https://safetyculture.com/topics/waste-management-system/ (on file with the Touro Law Review).

[19] Sharma et al., *supra* note *2.*

[20] Hamilton & Feit, *supra* note 11.

identifying and separating plastics, and compounding."[21] Recycling plastics offers several benefits, such as reducing carbon dioxide and other harmful gases in the atmosphere, requiring less energy, decreasing the demand for fossil fuel consumption and promoting a circular economy.[22] However, it may still release some chemicals such as sulfur, carbon, and other gases into the environment. [23] Additionally, some waste generated during the recycling process ends up in landfills, as recycling for another round can be limited. [24] As of 2019, many countries have not prioritized recycling over landfills or incineration.[25]

In theory, most plastics can be recycled, but practical implementation is more complex than it seems, with numerous barriers and challenges.[26] One primary challenge is the contamination of plastic waste. After use, plastic can become contaminated through various means, such as mixing different types of plastics, incorporating non-plastic materials, and exposure to dirt or other impurities.[27] Consequently, contaminated plastic must undergo rigorous cleaning and sorting which can be costly and time-consuming.[28] Moreover, many plastic products contain toxic additives that complicate recycling.[29] Seven harmful chemicals in plastics include bisphenols, alkylphenols, phthalates, perfluorinated compounds, brominated flame retardants, dioxin, and UV stabilizers.[30] Exposure to these chemicals has been associated with a variety of health issues, making their removal or neutralization necessary before recycling.[31] As a result, these chemicals make recycling more difficult because these toxic substances need to

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[21] *See generally* Niyitanga Evode et. al. *Plastic Waste and Its Management Strategies for Environmental Sustainability*, 4 CASE STUD. CHEM. & ENV'T ENG'G, Dec. 2021, https://www.sciencedirect.com/science/article/pii/S2666016421000645 [https://doi.org/10.1016/j.cscee.2021.100142].

[22] *Id.*

[23] *Id.*

[24] *Id.*

[25] *Share of Plastic Waste That is Recycled, Landfilled, Incinerated and Mismanaged, 2019*, OUR WORLD IN DATA, https://ourworldindata.org/grapher/share-plastic-fate (on file with the Touro Law Review) (last visited July 2, 2025).

[26] *What Do Plastics Have to Do With Climate Change*?, *supra* note 1.

[27] *Id.*

[28] *Id.*

[29] *Id.*

[30] 7 HARMFUL CHEMICAL TYPES IN PLASTICS, ENDOCRINE SOC'Y, https://www.endocrine.org/-/media/endocrine/files/topics/2020-dec-7-harmful-chemicals-backgrounder.pdf (on file with the Touro Law Review).

[31] Evode, *supra* note 21.

be removed or neutralized before it gets released when recycled. Despite these challenges, prioritizing recycling as the primary method of plastic waste management is crucial. From 1950 to 2015, "of the 5800 million tons of primary plastic no longer in use, only 9% has been recycled…"[32] To implement a holistic waste management strategy, it is important to have a recycling infrastructure.

Incineration, also known as waste-to-energy, involves burning waste in the presence of oxygen, releasing water molecules and carbon dioxide into the atmosphere.[33] While incineration offers benefits like waste reduction, heat and power production, and cost savings in waste transport, it also has disadvantages, including air pollution from carbon dioxide and greenhouse gas emissions and health risks from ash waste.[34] After incineration, harmful chemicals and heavy metals are left in ash residues, which are detrimental to the environment.[35] As a result, many environmentalists oppose incineration due to concerns about air quality and health impacts, advocating for recycling and waste reduction instead.[36]

Around 25% of plastic is incinerated, and approximately 60% ends up in landfills. [37] Landfilling involves burying waste beneath the Earth's surface, a process that can take many years for organic molecules to biodegrade and decompose. [38] For instance, plastic bags can take from ten to a hundred years to degrade in landfills. [39] Like

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[32] Nicole Liu, *The Effects of Plastic Pollution on the Environment*, STEM WITHOUT BOUNDARIES, https://www.stemwithoutboundaries.org/post/the-effects-of-plastic-pollution-on-the-environment (on file with the Touro Law Review) (last visited Nov. 17, 2025).

[33] Evode, *supra* note 21.

[34] *Id*. at 6.

[35] T.W Cheng, et al., *Treatment and Recycling of Incinerated Ash Using Thermal Plasma Technology*, 22 WASTE MGMT. Aug. 2002, https://www.sciencedirect.com/science/article/abs/pii/S0956053X01000435 [https://doi.org/10.1016/S0956-053X(01)00043-5].

[36] Dave Lucas, *Environmentalists Oppose Proposed Incinerator Ash Dump In Catskill; Public Meeting Tuesday*, WAMC NORTHEAST PUBLIC RADIO (Apr. 22, 2019, at 12:09 ET), https://www.wamc.org/hudson-valley-news/2019-04-22/environmentalists-oppose-proposed-incinerator-ash-dump-in-catskill-public-meeting-tuesday (on file with the Touro Law Review) .

[37] Jean-Paul Lange, *Managing Plastic Waste – Sorting, Recycling, Disposal, and Product Redesign*, 9 ACS SUSTAINABLE CHEM. & ENG'G, Nov. 29, 2021, https://pubs.acs.org/doi/10.1021/acssuschemeng.1c05013 (on file with the Touro Law Review).

[38] Evode et al., *supra* note 21.

[39] *Id.*

incineration, landfills have advantages and disadvantages. Landfills are cost-effective, but contaminate water and soil as landfills release methane and carbon dioxide into the ecosystem posing harm to wildlife.[40]

The management of plastic waste offers various disposal methods, including recycling, incineration, and landfills, each with its set of critical challenges for achieving a sustainable and eco-friendly environment. Despite the inherent challenges and barriers, recycling stands out as the preferred method among these waste management systems. While recycling may face hurdles such as contamination, complex sorting requirements, and economic viability issues, it offers a unique set of benefits, making it the most environmentally friendly choice. By transforming discarded plastics into new products, recycling conserves valuable resources, reduces the demand for virgin materials, and curtails the environmental impact associated with their extraction and production. Recycling plays a pivotal role in mitigating climate change by reducing greenhouse gas emissions compared to incineration and landfills. It promotes a circular economy, fostering sustainability by minimizing waste generation, conserving energy, and decreasing pollution. Furthermore, recycling contributes to the reduction of plastic litter in our ecosystems, protecting wildlife, and preserving the aesthetic beauty of our surroundings. To build a more eco-conscious and resilient future, it is imperative to prioritize recycling as the cornerstone of the plastic waste disposal strategy.

IV. CLIMATE CHANGE

Climate change refers to the long-term alterations in the Earth's climate patterns, particularly in temperature, precipitation, and weather events.[41] It is primarily driven by the emission of greenhouse gases, such as carbon dioxide, methane, and nitrous oxide.[42] These emissions trap heat from the sun, leading to a warming effect commonly known as the greenhouse effect.[43] It is important to note how the emission of

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[40] *Id.*

[41] *What is Climate Change?*, UNITED NATIONS: CLIMATE ACTION, https://www.un.org/en/climatechange/what-is-climate-change (on file with the Touro Law Review) (last visited July 2, 2025).

[42] DANIEL A. FARBER & CINNAMON P. CARLARNE, CLIMATE CHANGE LAW 4 (Saul Levmore, et. al., eds., 2nd ed. 2022).

[43] *Id.* at 38.

greenhouse gases leads to the greenhouse effect, a key mechanism behind climate change. By understanding this mechanism, we can grasp why reducing emissions is critical to mitigating climate change's impact.

Carbon dioxide is the most abundant and primary greenhouse gas that contributes to climate change.[44] Greenhouse gases naturally exists in the atmosphere and is also released by human activities.[45] Carbon dioxide is found in the ocean, soil, plants, and animals. It is naturally absorbed and emitted as part of the carbon cycle.[46] Carbon cycle occurs through processes like plant and animal respiration, volcanic eruptions, and ocean-atmosphere exchange.[47] However, human activities, particularly the combustion of fossil fuels in electricity, transportation, and industry also release significant amounts of carbon dioxide.[48]

Methane is the second most prevalent greenhouse gas emitted.[49] While methane has a shorter lifetime than carbon dioxide, it has a much higher heat-trapping capacity.[50] It is primarily emitted from "industry, agriculture, and waste management activities," as well as some natural sources like wetlands. [51] Methane is the primary component of natural gas.[52] In industries, such as manufacturing, chemical processing, and energy production, natural gas and petroleum systems are major sources of methane emissions.[53] In agriculture, livestock's digestive processes generate methane, making it a significant source of emissions.[54] Methane is also "generated in landfills as waste decompose[s] and in the treatment of wastewater."[55]

Lastly, nitrous oxide is released through human activities,

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[44] *Id.* at 19.
[45] *Id.*
[46] *Id.*
[47] *Causes of Climate Change*, U.S. ENV'T PROT. AGENCY (Dec. 27, 2016), https://19january2017snapshot.epa.gov/climate-change-science/causes-climate-change_.html (on file with the Touro Law Review).
[48] *Id.*
[49] *Overview of Greenhouse Gases: Methane Emissions*, U.S. ENV'T PROT. AGENCY (Oct. 6, 2016), https://19january2017snapshot.epa.gov/ghgemissions/overview-greenhouse-gases_.html#methane (on file with the Touro Law Review).
[50] *Id.*
[51] *Id.*
[52] *Id.*
[53] *Id.*
[54] *Id.*
[55] *Id.*

including "agriculture, fossil fuel combustion, wastewater management, and industrial processes."[56] The use of synthetic fertilizers adds nitrous oxide to agricultural soil.[57] Similar to methane, nitrous oxide is produced in the digestion process of livestock.[58] Additionally, it is emitted through the combustion of transportation fuels, with emission levels varying depending on the type of fuel and vehicle.[59]

While the greenhouse effect is essential for maintaining a stable and habitable temperature on Earth, human activities like the burning of fossil fuels, deforestation, and industrial processes have significantly increased the concentration of greenhouse gases in the atmosphere. In 2014, carbon dioxide "accounted for 80.9% of all U.S. greenhouse gas emissions from human activities."[60] Methane accounted for over 60% coming from human activities[61] and nitrous oxide accounted for about 40% of human activities.[62] Collectively, these greenhouse gases, along with other less common ones, contribute to global warming and climate change.

The emission of these greenhouse gases into the atmosphere has far-reaching and devastating consequences that include a wide range of environmental, societal, and economic impacts. One of the most pronounced effects of climate change is the global temperature rise.[63] From 2010 to 2019, the temperature was hotter than in any other decade in the past 1,300 years.[64] The continuous temperature increase will lead to more frequent and intense weather patterns, including heatwaves, droughts, hurricanes, floods, and wildfires. For example, "the first half of 2021 was marked by record of heat, drought, and wildfires

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[56] *Overview of Greenhouse Gases: Nitrous-Oxide Emissions*, U.S. ENV'T PROT. AGENCY (Oct. 6, 2016), https://19january2017snapshot.epa.gov/ghgemissions/overview-greenhouse-gases_.html#nitrous-oxide (on file with the Touro Law Review).

[57] *Id.*

[58] *Id.*

[59] *Id.*

[60] *Overview of Greenhouse Gases: Carbon-Dioxide Emissions*, U.S. ENV'T PROT. AGENCY (Oct. 6, 2016), https://19january2017snapshot.epa.gov/ghgemissions/overview-greenhouse-gases_.html#carbon-dioxide (on file with the Touro Law Review).

[61] *Overview of Greenhouse Gases: Methane Emissions*, *supra* note 46.

[62] *Overview of Greenhouse Gases: Nitrous-Oxide Emissions*, *supra* note 53.

[63] Courtney Lindwall, *What Are the Effects of Climate Change?*, NRDC (Oct. 24, 2022), https://www.nrdc.org/stories/what-are-effects-climate-change#agriculture (on file with the Touro Law Review).

[64] Jeff Turrentine & Melissa Denchak, *What Is Climate Change?*, NRDC (Sep. 1, 2021), https://www.nrdc.org/stories/what-climate-change#facts (on file with the Touro Law Review).

in the western United States and Canada, and by record rainfall and flooding in Europe."[65] Prolonged droughts can have devastating effects on agriculture and water resources, which can lead to food and water shortages.[66] For instance, "in 2012, severe drought impacted 80 percent of agricultural land in the United States. The drought affected the production of livestock and field crops such as wheat, corn, and soybean production in the Great Plains and Midwest and accounted for $14.5 billion in loss payments by the federal crop insurance program. In 2015, drought impacts to California's agricultural sector resulted in $1.84 billion in direct costs, a loss of 10,100 seasonal jobs, and surface water shortages of 8.7 million acre-feet."[67] In addition, the increase in temperature can disrupt ecosystems by affecting the distribution and behaviors of various species.[68] Plants and animals will struggle to adapt or migrate to suitable habitats, resulting in a heightened risk of extinction.

As the temperature increases, it also speeds up the melting of ice.[69] This acceleration in ice melt exposes darker ocean waters, which absorb more sunlight and further amplify warming—a process known as the albedo effect.[70] The melting of ice contributes to rising sea levels and an increased likelihood of coastal flooding, posing a substantial threat to coastal communities, infrastructures, and the environment.[71] In terms of economic and societal ramifications, coastal communities may face significant setbacks due to damage to homes, roads, and other essential infrastructure.[72] As environmental conditions worsen, residents displaced by flooding, sea-level rise, or storm surges may be compelled to migrate to less affected regions. This movement can disrupt the social fabric of both the origin and destination communities. The loss of residents can weaken local economies and social ties in coastal areas, while an influx of newcomers can place additional pressure on housing, employment, healthcare, and public services in receiving regions. Over time, these strains can deepen social and economic inequalities, particularly for populations that already have

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[65] *Id.*

[66] *National Integrated Drought Information System*, https://www.drought.gov/sectors/agriculture (on file with the Touro Law Review) (last visited Nov. 17, 2025).

[67] *Id.*

[68] Lindwall, *supra* note 63.

[69] *Id.*

[70] *Id.*

[71] *Id.*

[72] *Id.*

limited resources or opportunities.[73]

In summary, climate change affects human health, safety, the economy, and ecosystems. Addressing climate change is a global challenge that requires cooperation among nations, organizations, and individuals to reduce its impact and ensure sustainability. As an effort to mitigate climate change, strategies have been discussed, reviewed, and implemented that include reducing emissions of these gases through sustainable practices, the transition to clean energy sources, and international agreements aimed at limiting global temperature increases.

V. THE LINK BETWEEN PLASTIC PRODUCTION, PLASTIC WASTE MANAGEMENT, AND CLIMATE CHANGE

Although plastic and climate change are two distinct environmental issues, each with its own set of causes, consequences, and solutions, the link between them is multifaceted and intricately tied through its life cycle from extraction to end-of-life disposal. Nonetheless, greenhouse gas emissions from plastics production and disposal are often overlooked when discussing climate change issues.

Plastic contributes to climate change by emitting greenhouse gases ("GHG") throughout its life cycle. Plastic production emits a substantial amount of greenhouse gas emissions, including carbon dioxide, and methane, contributing to climate change.[74] Extraction, refinement, and the manufacture of plastics are all carbon-intensive activities. Even at the disposal stage, a significant amount of greenhouse gas is emitted into the atmosphere.[75] While the plastic industry is not the biggest contributor to climate issues ("around 3-8% of GHG emissions"), it still undermines efforts to reduce carbon pollution and prevent climate catastrophe, projected to double by 2060.[76] A carbon budget refers to the total amount of carbon dioxide emissions that can be released into the atmosphere while still keeping global temperature

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[73] *Id.*

[74] *Greenhouse Gas Emissions from Plastics, 2019*, OUR WORLD IN DATA, https://ourworldindata.org/grapher/greenhouse-gas-emissions-from-plastics (on file with the Touro Law Review) (last visited July 3, 2025).

[75] *Id.*

[76] Nihan Karali, et al., *Policy Brief: Climate Change Impacts of Plastics*, SCIENTISTS' COAL. FOR AN EFFECTIVE PLASTICS TREATY (July 12, 2023), https://ikhapp.org/stories-and-research-brief/policy-brief-climate-change-impacts-of-plastics/ [doi 10.5281/zenodo.7972055].

rise within a specific limit.[77] By 2050, it is estimated that greenhouse gas emissions from the plastic industry could consume around 13% of the remaining carbon budget, further straining efforts to meet climate goals.[78]

In addition to plastic production being interrelated with climate change, the disposal of plastic is also linked to climate change. Waste management practices play a pivotal role in shaping the cycle of plastics and their direct and indirect impact on climate change. The improper disposal and mismanagement of plastic have led to severe pollution issues and hindered efforts to mitigate its environmental effects. If the disposal of plastic continues to be mismanaged, it will present more severe greenhouse gas emissions issues in the near future.

As mentioned previously, there are several methods of plastic waste disposal, such as recycling, incineration, and landfills. While there are many benefits to these methods, they still have the disadvantages of emitting chemicals, like carbon dioxide and greenhouse gases, into the atmosphere. Studies estimated that around 10% of total emissions from the plastic lifecycle come mainly from incineration.[79] "In 2015, the CIEL report stated that approximately 5.9 million metric tons of carbon dioxide were emitted from plastic waste incineration in the U.S."[80] Moreover, incineration is detrimental to human health as it generates toxic air pollutants due to the chemicals released.[81]

When plastic waste is not recycled or incinerated, it often ends up in landfills, and could potentially reach our waterways. The most common items of waste found in rivers and oceans consist of bags, plastic bottles, food containers, wrappers, synthetic rope, fishing-related substances, plastic lids, industrial packaging, glass bottles, and cans.[82] Most of these items are plastic.[83] Plastics found in waterways may interfere with the ocean's ability to "absorb and sequester carbon

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[77] Luke Sussams, *Carbon Budgets Explained*, CARBON TRACKER (Feb. 6, 2018), https://carbontracker.org/carbon-budgets-explained/ (on file with the Touro Law Review).

[78] Hamilton & Feit, *supra* note 11.

[79] Karali et al., *supra* note 76.

[80] Sharma et al., *supra* note 2, at 5.

[81] *Id.*

[82] *What Are the Most Common Items of Waste Found in Rivers and Oceans?*, OUR WORLD IN DATA, https://ourworldindata.org/grapher/most-common-waste-rivers-oceans (on file with the Touro Law Review) (last visited July 3, 2025).

[83] *Id.*

dioxide."[84] In addition, when plastics are washed into the ocean, it emits methane and ethylene.[85] This will significantly impact climate change as more gases will be released due to the inadequate disposal of plastic.

Furthermore, "[p]lastics as carbon-based compounds have several toxic components, including phthalates, polyfluorinated chemicals, bisphenol-A, brominated flame retardants, and antimony trioxide."[86] When plastic waste is not disposed of properly, it typically transforms into microplastics through biodegradation or exposure to the sun, heat, or water. The microplastics are then leaked into our ecosystem such as our waters, soil, and even the air.[87] Leakage from plastic disposal is threatening, as it will release carbon dioxide and greenhouse gases into our ecosystem.[88] This exacerbates climate change and binds toxic chemicals to the microplastics, posing health risks to both humans and wildlife if ingested.[89] Moreover, plastic's durability and persistence in the environment contribute to its long-term impact on carbon sequestration and global ecosystems. "Researchers also found that microplastics reduced the growth of microalgae and the efficiency of photosynthesis…[which] degrades plankton's ability to remove carbon dioxide from the atmosphere."[90] Phytoplankton plays an essential role by taking carbon dioxide and storing it in the ocean via photosynthesis.[91] Nonetheless, effective waste management may help reduce the carbon footprint associated with plastic production and disposal, contributing positively to addressing climate change.

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[84] *Plastics and the Environment: Plastics and Climate Change*, GENEVA ENV'T NETWORK (May 19, 2025), https://www.genevaenvironmentnetwork.org/resources/updates/plastics-and-climate/ (on file with the Touro Law Review).

[85] Tsydenova & Patil, *supra* note 4.

[86] Evode, *supra* note 21.

[87] Sharma et al., *supra* note 2.

[88] Hamilton & Feit, *supra* note 11.

[89] Brooke Bauman, *How Plastics Contribute to Climate Change*, YALE CLIMATE CONNECTIONS (Aug. 20, 2019), https://yaleclimateconnections.org/2019/08/how-plastics-contribute-to-climate-change/ (on file with the Touro Law Review).

[90] *Id.*

[91] Renée Cho, *More Plastic Is on the Way: What It Means for Climate Change*, COLUM. CLIMATE SCH.: CLIMATE EARTH & SOC'Y (Feb. 20, 2020), https://news.climate.columbia.edu/2020/02/20/plastic-production-climate-change/ (on file with the Touro Law Review).

VI. POTENTIAL SOLUTIONS AND POLICY RECOMMENDATIONS

The life cycle of plastic directly and indirectly impacts climate change. To mitigate the climate impacts and maintain a sustainable environment, climate change plans should acknowledge and address the impacts of greenhouse gas emissions from plastics in their policies. From May 29, 2023, to June 2, 2023, the Intergovernmental Negotiating Committee met to develop an international legally binding instrument on plastic pollution.[92] Policymakers should continue to take advantage of the synergies between both climate change and plastic pollution as they have the same underlying issue of greenhouse gas emissions. The Paris Agreement is an International Treaty adopted in 2015 that aims to combat climate change by limiting global warming to below 2 degrees Celsius above pre-industrial levels, with efforts to keep it under 1.5 degrees.[93] It requires countries to set and communicate their own nationally determined contributions ("NDCs") to reduce greenhouse gas emissions.[94] The agreement also emphasizes the importance of adapting to climate impacts and providing financial support to developing nations for climate-related initiatives.[95] However, the Paris Agreement does not address the impacts of plastics on climate change and does not refer to fossil fuels.[96] The Paris Agreement's failure to address the impacts of plastics on climate change and its disregard for fossil fuels may be seen as grossly inadequate, given that climate mitigation policies alone cannot adequately address the complexities of plastic pollution. This oversight could be considered

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[92] *Intergovernmental Negotiations Committee on Plastic Pollution: Second Session (INC-2)*, UNITED NATIONS ENV'T PROGRAMME (June 27, 2025), https://www.unep.org/inc-plastic-pollution/session-2 (on file with the Touro Law Review). The Intergovernmental Negotiating Committee (INC) is a forum where nations negotiate international agreements on issues like climate change and environmental protection, aiming to address global challenges through collaborative policymaking. *Id.*

[93] *The Paris Agreement*, UNITED NATIONS: CLIMATE ACTION, https://www.un.org/en/climatechange/paris-agreement (on file with the Touro Law Review) (last visited July 3, 2025).

[94] *Id.*

[95] *Id.*

[96] Daniela Duran Gonzalez, Rachel Radvany & David Azoulay, *Reducing Plastic Production to Achieve Climate Goals: Key Considerations for the Plastics Treaty Negotiations*, CTR. FOR INT'L ENV'T LAW, Sep. 2023, at 1, 1, https://www.ciel.org/wp-content/uploads/2023/09/Reducing-Plastic-Production-to-Achieve-Climate-Goals_Sept21_V5.pdf (on file with the Touro Law Review).

highly ineffective, as climate change strategies alone cannot effectively substitute for comprehensive plastic policies. Hence, it is imperative that both agendas be addressed synergistically to yield meaningful environmental impacts. The Center for International Environmental Law also agrees and states that the "global plastics treaty needs to incorporate ambitious obligations that specifically target global plastic production."[97] It is projected that plastics will reach between "56Gt and 129Gt of carbon dioxide from 2020 to 2050, …represent[ing] between 10% and 32% of the entire global carbon budget."[98] With this projection, plastics will further prevent and compromise climate change plans. However, if plastic production reduction is incorporated into the Paris Agreement or a new treaty, there can be long-term benefits in getting closer to meeting the Paris Agreement's goal of 1.5°C, as outlined in the Paris Agreement, is crucial for averting the most severe impacts of climate change and preserving the planet's ecological balance.[99]

In addition to addressing climate change and plastic reduction together, there needs to be policies that address the entire lifecycle of plastics. These include (1) promoting zero-waste policies and a circular economy, (2) banning all single-use plastics, (3) ending plastic subsidies, and (4) mandating the extended producer responsibility policy.

A zero-waste policy is a set of guidelines aimed at minimizing waste generation, reducing the environmental impact of waste, and maximizing resource efficiency.[100] The primary objective of a zero-waste policy is to divert waste away from landfills, incinerators, and littering in waterways, and promote waste reduction and recycling towards a more sustainable and circular economy.[101] The benefit of the zero-waste policy is that non-essential plastic packaging would be eliminated, resulting in no emissions. Zero-waste systems indirectly reduce emissions through improved source separation and collection, as well as upstream approaches like bottled water bans."[102] While zero-waste and circular economy are distinct concepts, implementing zero-waste strategies is the most effective way to promote and achieve a

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[97] *Id.* at 2.
[98] *Id.* at 3.
[99] *Id.* at 2.
[100] *Zero-Waste Policy and Legislation*, ZERO WASTE (Feb. 9, 2021), https://www.zerowaste.com/blog/zero-waste-policy-and-legislation/ (on file with the Touro Law Review).
[101] *Id.*
[102] Hamilton & Feit, *supra* note 11, at 83.

circular economy. Similar to a zero-waste policy, circular economies aim to minimize resource use and waste by reusing, recycling, and regenerating products and materials.[103] The circular economy approach consists of biological materials and technical materials.[104] The challenge of plastic, a technical material, "involves keeping them in the economy for as long as feasibly possible, including by reducing the need for mining and production of virgin materials."[105] With a circular economy approach, plastics can be optimized for reuse by focusing on the product design and selection of raw materials, thereby creating renewable resources and minimizing the need for mining virgin materials, and harmful disposals such as incineration and landfills.

"Approximately 36% of all plastics produced are used in packaging, including single-use plastic products for food and beverage containers."[106] Thus, the second potential solution is to ban all single-use plastics, such as plastic bags, plastic straws, plastic utensils, and plastic packaging, which presents several environmental advantages. The reduction of plastic pollution in oceans and ecosystems, the preservation of wildlife, and the conservation of non-renewable resources will contribute to a healthier planet, with a predicted reduction of around 14 million tons of plastic ending up in our oceans.[107] This solution also helps decrease the carbon footprint associated with plastic production by reducing greenhouse gas emissions and promoting a more sustainable and environmentally friendly approach.

While numerous states across the United States have implemented bans and restrictions on single-use plastics, these measures fall significantly short. This deficiency may be attributed to various reasons, including incomplete coverage of all types of single-use plastics, challenges in enforcing compliance among businesses and consumers, lack of uniformity across the nation, and the global nature of the plastic pollution problem, indicating the need for higher-level, possibly

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[103] *See generally* LEWIS AKENJI & MAGNUS BENGTSSON, CIRCULAR ECONOMY AND PLASTICS: A GAP-ANALYSIS IN ASEAN MEMBER STATES (2019)

[104] *Id.* at 14.

[105] *Id.*

[106] Audrey Trinidad, *The Hidden Cost of Convenience: Who Pays for Our Single-Use Plastic Addiction?* (Jan. 9, 2025), https://plasticbank.com/blog/the-hidden-cost-of-convenience/ (on file with the Touro Law Review) (last visited Nov. 13, 2025).

[107] Seaside IT, *The U.S. Progress with Single-Use Plastic Bans*, SEASIDE SUSTAINABILITY, https://www.seasidesustainability.org/post/the-u-s-progress-with-single-use-plastic-bans (on file with the Touro Law Review) (last visited Nov. 17, 2025).

international interventions.[108]

Considering the environmental impact of plastic bags, which utilize 6% of the world's oil resources, with 40% dedicated to manufacturing plastic bags, there is a compelling case for states to consider a more comprehensive approach.[109] Instead of mere restrictions or plastic bag fees, a shift towards nationwide implementation of a ban on single-use plastics, especially plastic bags, is advisable. Each state should consider transitioning entirely to reusable bags, avoiding restrictions or plastic bag fees. However, it is crucial to evaluate the environmental trade-offs associated with alternatives.

Paper bags are advantageous in that they are easier to recycle due to their biodegradable nature.[110] Nevertheless, the production of paper bags is resource-intensive, requiring about "four times as much energy as it takes to produce a plastic bag."[111] Additionally, paper bags need to be used from three to forty-three times before its environmental impact breaks even with single-use plastics bags.[112] Despite these considerations, paper remains a more sustainable option than plastic due to its ease of recycling, as evidenced by the 68.1% recovery rate of paper consumed in the United States in 2018.[113]

On the other hand, reusable bags such as nonwoven polypropylene bags are considered superior to plastic bags. These bags only need to be reused eleven times to break even environmentally.[114] The most significant advantage of advocating for reusable bags is their potential to reduce litter in landfills and ecosystems, contributing to environmental sustainability. Fewer bags produced result in less energy consumption, aligning with our environmental goals.

The push for a single-use plastic ban encounters criticisms and resistance from manufacturers, consumers, and retailers. Economic concerns arise, including increased costs for businesses and

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[108] *Id.*

[109] Caroline Bailey, *Eco Friendly Plastic Bag Alternatives for Sustainable Retail Businesses*, GREEN BUS. BUREAU (Oct. 27, 2022), https://www.greenbusinessbenchmark.com/archive/retail-plastic-bag-alternatives (on file with the Touro Law Review).

[110] National Geographic Society, *Sustainable Shopping – Which Bag Is Best?*, NAT'L GEOGRAPHIC, (Oct. 19, 2023), https://education.nationalgeographic.org/resource/sustainable-shoppingwhich-bag-best/ (on file with the Touro Law Review).

[111] *Id.*

[112] *Id.*

[113] *Id.*

[114] *Id.*

consumers, as plastics are cheaper to produce than other alternative materials.[115] Additionally, consumer forgetfulness regarding reusable bags poses challenges. While paper bags are typically priced between fifteen to twenty cents, the cumulative impact on low-income families becomes a concern.[116] Moreover, the ban might lead to a surge in sales of other types of plastic, as observed in Ireland after a similar ban, witnessing "an increase of nearly 77% in sales of garbage bags, as individuals were essentially compelled to buy other types of plastic when prohibited from grocery bags."[117] Therefore, a plastic bag ban may be counterintuitive.

Despite these challenges, the adoption of reusable bags proves crucial for environmental sustainability. Washington and California exemplify the success of plastic bag bans, showing significant reductions in plastic bag usage and waste. Seattle witnessed a 50% decrease in plastic bag waste four years after implementing a ban, while California reported a 72% reduction in plastic bags during beach cleanups in 2017 compared to 2010.[118] These successes underline the broader benefits of eliminating single-use plastics, including reduced environmental impact, decreased harm to wildlife, diminished landfill impact, increased economic benefits, and improved recycling efforts due to the biodegradability of reusable bags.[119]

Moving beyond plastic bags, banning plastic packaging is pivotal in addressing the global environmental crisis. Approximately one-third of the waste generated in the United States constitutes packaging material. [120] The continued growth in demand and production of plastic packaging poses a significant threat, with potential carbon dioxide emissions reaching 1.34 gigatons per year by 2030, "an equivalent to the carbon emissions of three hundred, 500-megawatt coal-fired power

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[115] *Id.*

[116] *Envs 202: Should Oregon Ban Plastic Bags?*, UNIV. OREGON BLOG, https://blogs.uoregon.edu/plasticbagban/con/ (on file with the Touro Law Review) (last visited July 3, 2025).

[117] *Id.*

[118] BANNING SINGLE-USE PLASTICS, ENV'T AM., https://publicinterestnetwork.org/wp-content/uploads/2020/02/US-Single-Use-Plastics-Coastal_1_0.pdf (on file with the Touro Law Review) (last visited Oct. 22, 2024).

[119] *Id.*

[120] Jane Courtnell, *10 Eco-Friendly Packaging Alternatives for Your Businesses' Shipping Needs*, GREEN BUS. BUREAU (Aug. 30, 2022), https://www.greenbusinessbenchmark.com/resources/a-guide-to-sustainable-packaging-solutions (on file with the Touro Law Review).

plants."[121] To mitigate this, the adoption of alternative materials such as biodegradable plastics, compostable plastics, mushroom packaging, and paper packaging is advocated. [122] The adoption of alternative materials is more sustainable and environmentally friendly, which will reduce the demand for non-renewable resources and curtail the carbon footprint associated with the production and disposal of plastics. However, the environmental footprint of these substitutes varies based on factors like material, production process, usage, and disposal.

Examining the broader context, the federal ban on microbeads in cosmetics as seen in the Microbead-free Waters Act of 2015 serves as a promising example for guiding policies on other plastic-related products. [123] The Microbead-Free Waters Act of 2015 is a federal law that prohibits the manufacture and sale of personal care products containing microbeads—tiny plastic particles used in products like exfoliating scrubs and toothpaste.[124] This ban aims to reduce plastic pollution in waterways, as microbeads can easily pass through water filtration systems and contribute to environmental degradation and harm aquatic life.[125] Acknowledging the short-lived product lifetime of single-use plastics compared to those used in other industries. Plastics used in packaging will typically last 6 months or fewer, but plastics used in construction buildings will typically last up to 35 years.[126] Thus, a ban on single-use plastics is predicted to help prevent to global warming by reducing approximately 1.56 million tons of carbon dioxide and about 1% of emissions. [127] While these plastics are major

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[121] Pavel Corena, *Does Plastic Packing Contribute to Climate Change?*, MTPAK COFFEE, (Sep. 9, 2022), https://mtpak.coffee/2022/09/does-plastic-packaging-contribute-to-climate-change/#:~:text=September%209%2C%202022&text=If%20the%20demand%20and%20production,megawatt%20coal%2Dfired%20power%20plants (on file with the Touro Law Review).

[122] J.H. Song et al., *Biodegradable and Compostable Alternatives to Conventional Plastics*, NAT'L LIBR. MED., July 27, 2009, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2873018/ (on file with the Touro Law Review).

[123] U.S. FOOD & DRUG ADMIN., *The Microbead-Free Waters Act: FAQs*, (Feb. 25, 2022), https://www.fda.gov/cosmetics/cosmetics-laws-regulations/microbead-free-waters-act-faqs (on file with the Touro Law Review).

[124] *Id.*

[125] *Id.*

[126] Feng Wu, Manjusri Misra & Amar K. Mohanty, *Challenges and New Opportunities on Barrier Performance of Biodegradable Polymers for Sustainable Packaging*, 117 PROGRESS IN POLYMER SCI., June 2021, https://www.sciencedirect.com/science/article/pii/S0079670021000423 (on file with the Touro Law Review).

[127] Timo Herberz, Claire Y. Barlow & Matthias Finkbeiner, *Sustainability*

contributors to waste, their elimination holds the potential to enhance recycling efforts by improving the quality of recycled waste streams.[128]

The third proposed solution involves ending plastic subsidies, making a critical initiative due to its adverse effects on our ecosystem, wildlife, and climate change. A subsidy is when the government covers part of the cost for an industry.[129] In 2020, fossil fuel companies claimed $8.2 billion through the CARES Act.[130] Additionally, an estimated $15 billion annually is directed to the fossil fuel industry.[131] This financial advantage for fossil fuel companies, achieved by reduced taxes or exemptions, hampers the transition to cleaner energy sources, encouraging continued reliance on fossil fuels.[132]

These subsidies not only support fossil fuel extraction but also exacerbate issues in plastic production by reducing the cost of plastics, thereby increasing demand and production.[133] Halting plastic subsidies necessitates a multifaceted approach, involving policy changes, advocacy, and public awareness campaigns. Proposed policies may encompass imposing taxes or fees on plastic production, consumption, or single-use plastics, redirecting funds towards sustainable and eco-friendly materials. The elimination of plastic subsidies offers potential benefits for environmental conservation by reducing overall plastic production, fostering innovation in eco-friendly alternatives, and encouraging investment in waste management, including recycling infrastructure and technologies. However, this approach faces criticism and backlash on multiple fronts.[134] Concerns include the economic impact on job losses, short-term price increases for plastic products, and effects on

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Assessment of a Single-Use Plastics Ban, SUSTAINABILITY (May 5, 2020), https://www.mdpi.com/2071-1050/12/9/3746 (on file with the Touro Law Review).

[128] Jefferson Hopewell, Robert Dvorak & Edward Kosior, *Plastics Recycling: Challenges and Opportunities*, NAT'L LIBR. MED., Jul. 27, 2009, https://pmc.ncbi.nlm.nih.gov/articles/PMC2873020/ (on file with the Touro Law Review).

[129] Aarthi Ananthanarayanan, *Put an End to Fossil Fuel Subsidies*, OCEAN CONSERVANCY (June 29, 2021), https://oceanconservancy.org/blog/2021/06/29/end-fossil-fuel-subsidies/ (on file with the Touro Law Review).

[130] *Id.*

[131] *Id.*

[132] *Id.*

[133] QUAKER UNITED NATIONS OFFICE & EUNOMIA, PLASTIC MONEY: TURNING OFF THE SUBSIDIES TAP (2024), https://quno.org/sites/default/files/resources/Plastic%20Production%20Subsidies%20Modelling%20-%20Phase%201%20report%20v1.0.pdf (on file with the Touro Law Review).

[134] *Id.*

consumers and businesses relying on affordable plastic materials[135]. Unintentional shifts towards alternative materials with environmental challenges could potentially negate intended environmental benefits.[136] Despite these challenges, the elimination of plastic subsidies is deemed a crucial step towards a more sustainable and environmentally friendly future, addressing the issue at its root.

The final proposed solution involves the global implementation of an Extended Producer Responsibility ("EPR") policy. EPR shifts the responsibility for managing a product's end-of-life from the consumer or local government to the producer.[137] This transformative waste management approach, when applied to plastic production, mandates manufacturers to assume greater responsibility for the entire lifecycle of plastics, thereby increasing recycling rates.[138] This aim is to encourage producers to design products with the ease of recycling, reuse, or disposal in mind.

However, EPR policies face criticism and backlash. Concerns include the potential passing of costs onto consumers through increased prices, placing a burden on small businesses lacking resources for comprehensive waste management, and the complex reporting and compliance requirements leading to free riding issues[139]. Despite these challenges, EPR regulations have proven highly efficient in the European Union ("EU"), where over 80% utilization is observed for packaging waste.[140] The United States and other countries are encouraged to adopt similar well-established EPR systems as a model framework to enhance recycling rates.

Currently, seven extended producer responsibility bills, including one in California, have been passed in the United States.[141] On June

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[135] Ananthanarayanan, *supra* note 129.

[136] Patrick Schröder, Jack Barrie & Jon Wallace, *A Future Without Plastics?*, CHATHAM HOUSE (Nov. 12, 2024), https://www.chathamhouse.org/2022/08/future-without-plastic (on file with the Touro Law Review).

[137] Khairun Tumu, Keith Vorst, & Greg Curtzwiler, *Global Plastic Waste Recycling and Extended Producer Responsibility Laws*, 348 J. ENV'T MGMT., Dec. 15, 2023, https://www.sciencedirect.com/science/article/pii/S0301479723020303?via%3Dihub [https://doi.org/10.1016/j.jenvman.2023.119242].

[138] Tumu, Vorst & Curtzwiler, *supra* note 132.

[139] *Extended Producer Responsibility 101*, THE RECYCLING P'SHIP, https://recyclingpartnership.org/extended-producer-responsibility-101/ (on file with the Touro Law Review).

[140] Tumu, Vorst & Curtzwiler, *supra* note 132.

[141] *Extended Producer Responsibility Packaging Laws in the United States*,

30, 2022, California enacted a bill that implemented an extender producer responsibility program for printed paper and packaging.[142] The state is mandating that all plastic packaging reach a 30% recycling rate by 2028 and 65% by 2032.[143] By 2032, the Producer Responsibility Organization ("PRO") must develop and implement a plan to achieve reduction requirements set in the legislation.[144] Once this plan is in place, producers must not sell, offer for sale, or distribute for sale in or into the state the materials covered in the bill unless the producer is approved by the PRO.[145]

On the other hand, several other states, such as New York, are currently considering legislative proposals. In New York, the Packaging Reduction and Recycling Infrastructure Act currently await approval in the Senate Committee.[146] The proposed legislation targets companies with a net annual income over $1 million, obliging them to develop a compliance plan for packaging and recycling provisions.[147] These companies would also be required to achieve incremental reductions in packaging, 10% within three years, 20% within five years, 30% within eight years, 40% in 10 years, and 50% in 12 years.[148] Moreover, the proposed law aims to eliminate 12 toxic chemicals from packaging, including PFAs, lead, cadmium, formaldehyde, and halogenated flame retardants.[149] If this bill is passed, it could instigate

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PERKINS COIE (Aug. 31, 2023), https://www.perkinscoie.com/en/news-insights/extended-producer-responsibility-packaging-laws-in-the-united-states.html#:~:text=The%20following%20states%20have%20passed,single%2Duse%20food%20service%20ware (on file with the Touro Law Review).

[142] S.B. 54, 2021-2022 Reg. Sess. (Cal. 2022).

[143] *Id.*

[144] *Id.*

[145] *California State Senate Bill 54 Chaptered (2022) – (Passed)*, SUSTAINABLE PACKAGING COAL. (June 30, 2022), https://epr.sustainablepackaging.org/policies/SB54CH (on file with the Touro Law Review).

[146] S.B. S4246A, 2023-2024 Leg. Sess., (N.Y. 2023), https://www.nysenate.gov/legislation/bills/2023/S4246/amendment/A (on file with the Touro Law Review).

[147] Kate Lisa, *New York Businesses Slam Amended Packaging Reduction Bill*, SPECTRUM NEWS 1 (June 5, 2023, at 21:20 ET), https://spectrumlocalnews.com/nys/central-ny/politics/2023/06/05/businesses-slam-amended-packaging-reduction-bill#:~:text=The%20legislation%2C%20nicknamed%20the%20Packaging,waste%20and%20reduce%20used%20toxins (on file with the Touro Law Review).

[148] *Id.*

[149] *N.Y. Can Lead on Reducing Plastic: The Packaging Reduction and Recycling Infrastructure Bill Needs to Pass This Spring*, DAILY NEWS (May 30, 2023, at 09:00

significant changes in the packaging industry, particularly given New York's status as one of the largest packaging markets in the country.[150] Manufacturers would be compelled to alter their product designs and introduce sustainable alternatives to avoid losing consumers.[151] Additionally, the success of such legislation in New York could pave the way for other states to adopt similar measures.

While these states are forging a path towards a cleaner and more sustainable environment, the primary obstacle lies with legislation. For example, New York has introduced an EPR bill proposal that is currently pending and undergoing negotiations. Concerns have been raised, stating that the legislation "deviates from the principles of well-designed EPR policy, with specific concerns about bans of non-recyclable packaging that could have a disproportionate impact on low-income consumers."[152] The desired outcomes, it is emphasized, will only be realized "if the legislation includes specific reduction requirements and standards for recyclability, recycled content, and elimination of toxic substances," rather than relying on self-regulation.[153]

In sum the United States has initiated measures to advance the concept of a circular economy. The subsequent crucial step involves the uniform implementation of a global EPR program. Although the journey to end plastic subsidies may pose challenges, it presents a transformative opportunity to alleviate the environmental burden of plastic production, fostering a more sustainable future that positively contributes to mitigating climate change.

ET), https://www.nydailynews.com/2023/05/30/ny-can-lead-on-reducing-plastic-the-packaging-reduction-and-recycling-infrastructure-bill-needs-to-pass-this-spring/ (on file with the Touro Law Review).

[150] *Id.*

[151] *Id.*

[152] Marissa Heffernan, *Packaging EPR Bill in New York Revived as Session Winds Down*, RESOURCE RECYCLING, (June 12, 2023), https://resource-recycling.com/recycling/2023/06/05/packaging-epr-bill-in-new-york-revived-with-days-left/#:~:text=In%20an%20statement%2C%20it%20noted,take%20into%20account%20the%20proactive (on file with the Touro Law Review).

[153] *Extended Producer Responsibility (EPR)*, BEYOND PLASTICS (Oct. 22, 2024), https://www.beyondplastics.org/epr#:~:text=Extended%20producer%20responsibility%20(EPR)%20is,Canada%20and%20the%20European%20Union (on file with the Touro Law Review).

VII. CONCLUSION

In conclusion, research has revealed the intricate relationship between plastic production, plastic disposal systems, and climate change. Plastic production is a significant contributor to climate change, with the release of greenhouse gases such as carbon dioxide, methane, and nitrous oxide during the plastic's life cycle. Similarly, the disposal of plastic through various methods, including recycling, incineration, and landfills, also plays a notable role in emitting these pollutants, amplifying the impact on our environment.

The synergy between plastic and climate change underscores the urgent need for coordinated global action, as they are deeply intertwined. Tackling one issue without addressing the other is an incomplete approach to addressing our environmental challenges. As mentioned, there are various ways that the plastic industry exacerbates climate change risks of emitting greenhouse gases and posing a severe challenge to meet the goals set in the Paris Climate Agreement. Nonetheless, there are potential solutions to mitigate the climate impact of plastic production and disposal. These solutions include implementing a global treaty or policy to regulate plastic pollution, encouraging the adoption of zero-waste policies and the establishment of a circular economy, banning single-use plastics, ending plastic subsidies, and mandating the extended producer responsibility policy.

The interconnected nature of plastic production, disposal, and climate change calls for a comprehensive and collaborative approach. Adopting the proposed solutions and collaborating globally can reduce the environmental impact of plastic, mitigate climate change, and safeguard the planet for future generations. The path ahead may be challenging, but with dedication and coordinated efforts, we have the power to make a positive impact on our environment and create a more sustainable future.