NOTES

PROMOTING RESPONSIBLE TRADE IN CONSUMER PLASTICS TO SUPPORT THE DEVELOPMENT OF A CIRCULAR PLASTICS ECONOMY

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> "Plastics are fossil fuels in another form & pose a serious threat to human rights, the climate & biodiversity . . . . I call on countries to look beyond waste and turn off the tap on plastic."[1]
>
> –*António Guterres*

ABSTRACT

This Note aims to explore trade policy options that support plastics circularity by shifting economic incentives away from the unsustainable extraction of virgin fossil fuels for primary plastics production towards efficient resource use that recaptures the lost economic value inherent in plastic waste. This Note will also highlight challenges and opportunities faced by the United States, which holds enormous purchasing power as the top importer of intermediate and final manufactured plastics products, synthetic textiles, and plastics packaging.[2] The United States is also a top two exporter of plastic waste.[3] As such, the United States is in a uniquely powerful position to reverse the plastics pollution crisis and lead international markets toward a net-zero plastics economy.

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1. António Guterres, *@antonioguterres*, X (Dec. 1, 2022, 5:45 PM), https://x.com/antonioguterres/status/1598667368296751109.

2. Diana Barrowclough (Senior Economist, Division on Globalisation and Development Strategies, UNCTAD) et al., *Global Trade in Plastics: Insights From the First Life-Cycle Trade Database*, at 18, UNCTAD/SER.RP/2020/12 (Dec. 2020), https://unctad.org/system/files/official-document/ser-rp-2020d12_en.pdf.

3. *Id.* at 17.

Tremendous efforts are currently underway at the international policy level to address the serious environmental and humanitarian threat that plastics pose. This Note aims to analyze some of these efforts to identify best practices and inform this trade policy exploration. The Paris Agreement set an ambitious goal to keep global warming below 1.5 degrees Celsius. The trajectory of the plastics sector will play a materially significant role in whether this global target is achieved. The following three high-level targets, inspired by current international policy efforts, may serve as useful anchors to guide the development of specific, legally binding multilateral provisions across the full lifecycle of plastics: (1) commit to recycled polymers targets of at least 25% of production by 2030; (2) end plastics pollution by 2040; and (3) decarbonize the plastics sector to reach net zero by 2045.

This Note begins by identifying key drivers of the current plastics pollution crisis and the obstacles that have thwarted previous efforts towards circularity. First and foremost, plastics circularity requires policy change that economically disincentivizes single-use and virgin plastics products, incentivizes reuse and high-value non-toxic materials, and expands the scope and scale of advanced plastics recycling. Carefully crafted trade policy that takes a whole systems approach to creating the right economic incentives for circularity across the plastics lifecycle is critical to scaling existing technology solutions and achieving an end to plastics pollution.

The United Nations Sustainable Development Goals (SDGs) require concerted efforts to address the triple planetary crises of: (1) climate change; (2) nature and biodiversity loss; and (3) pollution and waste.[4] *The plastics sector contributes to each of these crises and must shift its trajectory to become part of a low-carbon circular economy. Through the right market incentives and the liberalization of existing technological advancements in recycling, bioplastics, and plastics manufacturing powered by renewable energy, the plastics sector can decarbonize and achieve net zero by 2045. Biodiversity loss and pollution can both be addressed while simultaneously accelerating decarbonization efforts through intelligent product design policy standards. Product design standards developed by a policy panel that include waste management industry specialists, as well as scientists, can significantly improve recycling rates, eliminate toxins from the environment, and end plastics pollution.*

4. Inger Andersen, *A Leap Forward for Environmental Action*, U.N. ENV'T PROGRAMME (Mar. 2, 2022), https://www.unep.org/news-and-stories/speech/leap-forward-environmental-action.

I. ORIGINS OF THE PLASTICS ECONOMY

It is hard to imagine a world without plastic, yet its history is relatively new. Plastics were developed in the early twentieth century, only reaching the commercial consumer market in the 1950s.[5] Plastics production has exponentially increased: in the past thirteen years, the global plastics industry has produced half of all plastics consumed since 1950.[6] The recent history of plastics serves as a reminder that despite the massive scale of the plastics pollution crisis, "we are not helpless. What we did, we can undo."[7] Inger Andersen, Executive Director of the United Nations Environment Programme (UNEP), recalled:

> [I]n the space of one human lifetime, we have created a massive problem. I remember my mother telling me about sitting in a café immediately after Denmark had been liberated, before I was born. At the table next to her were two American businessmen with colourful blocks made from a strange new material. As she eavesdropped, the curious 18-year-old schoolgirl heard them say, "This is plastic. This is the future."
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> These businessmen foresaw only a future of profit and convenience. They did not foresee a future—now our present—in which plastic pollution is everywhere, from the deepest ocean trench to the highest mountain peak. We see this pollution. We feel its climate impacts. We live with the sheer waste of taking a versatile, durable material and making it disposable—losing all value instead of retaining it.
>
> Now we must make the wrong-headed way we manufacture and use plastic the past.[8]

Since the 1970s, the rate of plastics production has "grown faster than that of any other material."[9] Global dependence on this functional, durable, lightweight, and inexpensive material has swelled to unmanageable proportions as plastic waste streams far outpace environmentally sound waste management infrastructure. Only nine

5. Roland Geyer et al., *Production, Use, and Fate of All Plastics Ever Made*, SCI. ADVANCES, at 1 (July 19, 2017), https://www.science.org/doi/pdf/10.1126/sciadv.1700782?fbclid=IwAR1W32.

6. *Id.*

7. Andersen, *supra* note 3.

8. *Id.*

9. *Our Planet is Choking on Plastic*, U.N. ENV'T PROGRAMME, https://www.unep.org/interactives/beat-plastic-pollution (last visited Oct. 8, 2024).

percent of the seven billion tons of plastic waste generated has been recycled.[10] Nearly seventy-nine percent of plastics, including single-use plastics, end up in landfills or are discarded in nature.[11] The remaining plastic waste is incinerated, creating damaging consequences for human and environmental health.[12]

In just over a decade of unbridled plastics production, toxic chemicals from billions of tons of plastics have seeped into the environment, overwhelmed oceans with hazardous microplastics, and polluted the air through incineration. Marine plastics pollution has garnered international concern, with an estimated eleven million metric tons of plastic currently entering the ocean each year—a rate which is projected to triple by 2040.[13] By the time you finish reading this Note, the equivalent of over a dozen garbage trucks full of plastic will have been dumped into the ocean.[14]

The plastics pollution crisis also adds billions of tons of greenhouse gas (GHG) emissions to the atmosphere annually. In 2019, plastics generated 1.8 billion tons of GHG emissions, which is set to more than double to 4.3 billion tons by 2060.[15] If plastics were a country, it would be the fifth largest emitter.[16] By 2050, plastics are projected to account for an outsized fifteen percent of the global annual carbon budget under the Paris Agreement.[17]

A. *The Role of Trade in the Plastics Economy*

Trade is central to addressing the issue of global plastics pollution. No country is untouched by the trade in plastics, which accounts for approximately five percent of global trade.[18] In 2021, trade in plastics reached a staggering USD 1.2 trillion, which represents the

10. *See Id.*

11. Geyer et al., *supra* note 5, at 1.

12. *Id.* at 2.

13. *From Pollution to Solution*, U.N. ENV'T PROGRAMME, https://www.unep.org/interactives/pollution-to-solution (last visited Oct. 8, 2024).

14. *Id.*

15. *Plastic Leakage and Greenhouse Gas Emissions Are Increasing*, OECD, https://www.oecd.org/environment/plastics/increased-plastic-leakage-and-greenhouse-gas-emissions.htm (last updated Aug. 17, 2022).

16. The top four emitters include China, U.S., India, and Russia. Johannes Friedrich et al., *This Interactive Chart Shows Changes in the World's Top 10 Emitters*, WORLD RES. INST. (Mar. 2, 2023), .

17. Diana Barrowclough & Carolyn Deere Birkbeck, *Transforming the Global Plastics Economy: The Role of Economic Policies in the Global Governance of Plastic Pollution*, SOC. SCIS., at 4 (Jan. 14, 2022), https://doi.org/10.3390/socsci11010026.

18. *Global Plastics Trade Hits Record $1.2 Trillion*, U.N. CONF. ON TRADE & DEV. (Nov. 10, 2022), https://unctad.org/data-visualization/global-plastics-trade-reached-nearly-1.2-trillion-2021.

transboundary movement of nearly 370 million metric tons of plastics.[19] While trade in plastics is not a proxy for plastics production, over sixty percent of certain categories of plastics products (i.e., synthetic textiles) enter the global market.[20] Plastics trade is multidirectional and multifaceted throughout plastics' lifecycle, from fossil fuel feedstock to final manufactured goods, and plastic waste. As such, international trade is a powerful tool to address plastics pollution through regulatory coordination, multilateral and plurilateral agreements, and unilateral actions that empower governments to cooperatively address this serious environmental challenge.

In March 2022, during the fifth session of the U.N. Environmental Assembly (UNEA-5.2), a landmark resolution was passed to End Plastic Pollution by 2040 (UNEA Resolution 5/14) and reach an internationally legally binding agreement by 2024.[21] Lauded as "the most significant environmental multilateral deal since the Paris accord," UNEP Executive Director Inger Andersen called on Members and the International Negotiations Committee (INC) to "explore all options" and adopt a full life-cycle approach to forge clear provisions that are legally binding.[22]

II. Key Drivers of the Plastics Economy

Understanding the drivers of the plastics economy is a critical first step to addressing plastics pollution and crafting effective policy responses. Yet, the absence of a multilateral agreement on key definitions, international standards, and an adequately granular Harmonized Commodity Description and Coding System (HS) poses significant challenges to transparency and data collection regarding the trade flow of plastics across its complex lifecycle.

The HS developed by the World Customs Organization (WCO) is used by over 200 countries and covers over ninety-eight percent of all

19. *Update: Plastics and the Environment: Plastics and Trade*, Geneva Env't Network, https://www.genevaenvironmentnetwork.org/resources/updates/plastics-and-trade/ (last updated Sep. 21, 2024). "To give a sense of the relative scale, global cotton fabrics exports were just USD 12. 9 billion in 2017 paper exports amounted to USD 170.5bn in 2019; glass and glassware USD 76. 5 billion; and pharmaceutical products amounted to USD 392.9bn in 2019." Barrowclough et al., *supra* note 1, at 14.

20. U.N. Conf. on Trade & Dev., *supra* note 18.

21. *Historic Day in the Campaign to Beat Plastic Pollution: Nations Commit to Develop a Legally Binding Agreement*, U.N. Env't Programme (Mar. 2, 2022), https://www.unep.org/news-and-stories/press-release/historic-day-campaign-beat-plastic-pollution-nations-commit-develop.

22. Andersen, *supra* note 3.

merchandise products traded internationally.[23] The HS is commonly used by governments for tariff negotiations and other trade policy measures, yet it does not differentiate plastics products or plastic waste based on sustainability criteria.[24] The lack of a sufficiently granularized HS has left governments "repeatedly hamstrung in their efforts to liberalize trade in certain environmental goods and to implement MEAs."[25]

In 2020, the U.N. Conference on Trade and Development (UNCTAD) and the Graduate Institute launched a Plastics Database as a "first attempt to quantify and map global trade flows across entire life cycles of plastics . . . compil[ing] data on a far broader set of plastics-related inputs and products than those commonly used."[26] Previously, plastics trade data only accounted for non-hidden flows found in HS Chapter 39 Plastics and Articles Thereof.[27] The UNCTAD Plastics Database goes beyond HS Chapter 39 to include: (1) input flows, such as flows in feedstocks used in the production of primary plastics; and (2) semi-hidden flows, such as synthetic textiles, rubber, and other plastics products that can be identified under other chapters of the HS.[28]

The Plastics Database revealed that plastics trade was forty percent higher by value and twenty-five percent higher by volume than previous estimates.[29] While these findings more accurately approximate plastics trade, they still represent an underestimation since they do not include "embedded" or "hidden" plastics found in computers, electronics, car components, packaging to transport goods, home appliances, etc. Hidden flows and other gaps in data (i.e., countries that do not self-report data) continue to obscure the true scope and scale of plastics trade and limit policymakers' pollution mitigation objectives. Methodologies to trace these unaccounted hidden flows are in development, including periodic revisions to the HS Chapter 39 Plastics and

23. *See What is the Harmonized System (HS)?*, WORLD CUSTOMS ORG., https://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx (last visited Oct. 8, 2024).

24. Barrowclough et al., *supra* note 1, at 10-11.

25. CAROLYN DEERE BIRKBECK, GREENING INTERNATIONAL TRADE: PATHWAYS FORWARD 50 (2021), https://unctad.org/system/files/information-document/BioTrade_GITPF_publication_en.pdf.

26. Barrowclough et al., *supra* note 1.

27. *Id.* at 11.

28. *Id.*

29. *Id.* at 11-12 (figure based on 2018 data) (including semi-hidden flows from other HS chapters, potential overstatement of plastic quantities through double-counting of intermediate and final plastic products from earlier life-cycle stages).

Articles Thereof.[30] Yet significant work remains for the HS to be used as an effective tool for plastics trade policy solutions.[31]

A. *Plastics' Life-Cycle Analysis*

The UNCTAD Plastics Database tracks trade flows across the plastics' lifecycle in five stages: (1) primary forms of plastics (i.e., fossil fuel feedstock, chemical additives, resin pellets, and synthetic fibers); (2) intermediate forms of plastics (i.e., primary plastics assembled into larger elements such as sheets, films, plates, and yarns); (3) manufactured plastic goods–intermediate (i.e., parts for cars, household appliances, or woven synthetic textiles); (4) manufactured plastic goods; and (5) plastic waste.[32] These five stages inform a life-cycle approach to understanding the drivers of plastics pollution.

Upstream drivers include structural issues such as fossil fuel subsidies that promote unsustainable production and consumption practices, as well as limit the economic viability of plastics recycling and plastics substitutes. Midstream drivers include product design flaws such as unnecessary single-use plastics and other poorly designed, low-value plastics that are difficult, cost-prohibitive, or even toxic to recycle. Downstream, or "end-of-pipe," drivers of plastics pollution include the lack of capacity for environmentally sound waste management and adequate recycling facilities.

1. Upstream: Fossil Fuel Subsidies, Toxic Additives, and Carbon Emissions

Plastics production begins with the extraction of fossil fuels which, together with additives that may or may not be toxic, form the feedstock for over ninety-eight percent of virgin plastics.[33] By 2050, CO_2 emissions from the plastics sector are forecast to rise ninety percent accounting for twenty percent of total oil consumption (assuming current plastic demand trends continue).[34] Trade policy measures that encourage the decarbonization of the plastics sector can have a significant impact on mitigating GHG emissions to achieve international commitments made under the Paris Agreement.

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30. *Id.* at 9.

31. Harmonized Tariff Schedule of the United States (HTSUS), Ch. 39 § VII. *See also infra* Section III(C)(ii).

32. Barrowclough et al., *supra* note 1 at 14.

33. U.N. ENV'T. PROGRAMME, *supra* note 9.

34. Barrowclough & Birbeck, *supra* note 17 at 4.

Decoupling plastics production from fossil fuels will require significant policy intervention to create market conditions that promote: (1) recycled plastics; (2) bioplastics; (3) plastics alternatives; and (4) plastics production fueled by renewable or clean energy sources. Fossil fuel subsidies distort and externalize the true costs of virgin plastics, which limit the economic viability of recycled plastics, bioplastics, and alternatives. The costs associated with sorting plastics by resin type, deodorization, extrusion, and so on, currently outweigh the value of recycled plastics output when compared with manufacturing plastics products solely from virgin, fossil fuel-based feedstocks. Additionally, bioplastics and plastics alternatives cost up to two times that of virgin polymers.[35]

This market distortion encourages unsustainable production and consumption practices as the petrochemical industry seeks to invest USD 400 billion for eighty megatons of new production capacity for virgin plastics by 2024.[36] International efforts to restrict global warming to 1.5 degrees Celsius and reduce production of virgin plastics create the risk that these assets will become stranded due to regulatory changes.[37] The European Union (EU) has banned several types of single-use plastics.[38] Eight states in the United States, as well as thirty-four African countries, have also banned single-use plastic bags.[39] While these efforts demonstrate positive legislative acts to reduce the level of plastics production, consumption, and pollution, "bans like Europe's only account for about 5% of plastics demand."[40]

Undeterred, the petrochemical industry prepares to increase fossil fuel flows through the soaring plastics industry, even as the energy sector continues to transition towards clean and renewable sources.[41] Shell invested USD 6 billion in a new ethane cracking plant in Monaca, Pennsylvania that opened in November 2022 to produce an additional 1.6 million tons of plastics annually.[42] The facility is expected to reach

35. Ellen Palm et al., *Electricity-Based Plastics and Their Potential Demand for Electricity and Carbon Dioxide*, 129 J. CLEANER PROD. 549, 549 (2016).

36. Kingsmill Bond, *The Future's Not in Plastics: Why Plastics Demand Won't Rescue the Oil Sector,* CARBON TRACKER (Sep. 4, 2020), https://carbontracker.org/reports/the-futures-not-in-plastics/.

37. *Id.*

38. Beth Gardiner, *The Plastics Pipeline: A Surge of New Production Is on the Way*, YALE ENV'T 360 (Dec. 19, 2019), https://e360.yale.edu/features/the-plastics-pipeline-a-surge-of-new-production-is-on-the-way.

39. *Id.*

40. *Id.*

41. Bond, *supra* note 36.

42. Gardiner, *supra* note 38.

full operating capacity this year.[43] For this facility, Shell received a USD 1.6 billion tax break from Pennsylvania while officials in Ohio and West Virginia vie for additional ethane cracking facilities to bring industrial jobs to their respective states.[44] The tri-state region encompassing Pennsylvania, Ohio, and West Virginia has enough ethane to supply four more cracking facilities like Shell's.[45] An analyst remarked, "unless production slows, they'll just find something else to wrap plastic in" whether consumers want it or not.[46]

As these ethane cracking facilities are built, investors will want to maximize profitability, which means operating at or near maximum output levels. Strong regulatory measures with clear phase-out provisions must be enacted immediately to put investors and the petrochemical industry on notice that these capital expenditures are better allocated to support the transition towards a more circular plastics economy rather than risk billions of U.S. dollars' worth of stranded assets, or worse, environmental degradation beyond repair from the successful operation of these facilities. Plastic waste "is expected to present an annual financial risk of USD 100 billion" by 2040.[47] Critical investment to expand recycling capacity and environmentally sound waste management remain inadequate, disproportionately impacting developing countries as the largest importers of plastic waste.[48]

2. Midstream: The High Cost of Poor Product Design

The global plastics market is valued at USD 580 billion (in 2020), with the annual global cost of municipal solid waste management at USD 38 billion (in 2019).[49] Product design policy that eliminates toxic additives and promotes the use of high-value plastics for cost-effective mechanical recycling can unlock enormous economic opportunity and "[c]reate over 700,000 jobs, mainly in the global south."[50] By 2040, "[a] comprehensive circular economy approach could ... reduce virgin

43. *After Years of Construction, Shell Ethane Cracker Starts Up*, ASSOC. PRESS (Nov. 15, 2022), https://apnews.com/article/business-pittsburgh-pennsylvania-climate-and-environment-10b988d28f368d116e681836ee0cb283.

44. Gardiner, *supra* note 38.

45. Ron Whitfield & Rajeevee Panditharatna, *Petrochemical Cluster: A Bright Future for the Tri-State Region*, S&P GLOB. (May 25, 2018), https://www.spglobal.com/marketintelligence/en/mi/research-analysis/petrochemical-cluster-a-bright-future-for-the-tristate-region.html.

46. Gardiner, *supra* note 38.

47. U.N. ENV'T PROGRAMME, *supra* note 13.

48. *See infra* Section II(A)(3).

49. U.N. ENV'T PROGRAMME, *supra* note 9.

50. Andersen, *supra* note 3.

plastic production by fifty-five percent . . ., save governments USD 70 billion," reduce eighty percent of the volume of plastics entering oceans, and reduce twenty-five percent of GHG emissions.[51] Realizing these incredible benefits requires the elimination of single-use virgin plastics and the implementation of design policy standards that address the greatest challenges associated with recycling plastics.

Plastics recycling is highly nuanced and requires specific recycling methods[52] and specialized equipment[53] due to the wide variety of chemical additives used to create a range of plastics compositions. Most material recovery facilities (MRFs) will only accept very limited types of high-value plastics,[54] like those most commonly found in plastic bottles. MRFs often lack the capacity to process thin and flexible plastics that require special equipment. Mixed and multilayered plastics, plastics containing toxic chemical additives, or plastic waste contaminated by food are also often unrecyclable.

Recyclable plastics can generally only be recycled once or twice through primary and secondary mechanical recycling (i.e., from bottle-to-bottle). This is unlike glass, aluminum, and other metals, which can theoretically be recycled indefinitely because they do not degrade during the recycling process.[55] A plastic polyethylene terephthalate (PET) bottle, by contrast, undergoes degradation when recycled due to an extrusion process that leads to thermo-oxidative and shear-induced chain scission.[56] Extrusion shortens the polymer chain length and lowers its mechanical properties, strength, and processability.[57] While advancements in recycling technology continue to improve this process, degradation of the polymer chain is currently mitigated by the addition of virgin plastics polymers. Under average recycling

51. *Id.*

52. I.e., mechanical recycling, chemical recycling, or energy recovery through pyrolysis.

53. Resin identification code: 3-6; includes: Polyvinyl Chloride – PVC, Low-Density Polyethylene – LDPE, Polypropylene – PP, and Polystyrene – PS. Examples: cling wrap, hoses, packaging film, butter tubs, ketchup, or bottles.

54. Resin identification code: 1 and 2; includes: Polyethylene Terephthalate – PET or High Density Polyethelyne – HDPE.

55. Plastics recycling rates are far less than the recycling rates for materials like steel (70%), aluminum (49%), and corrugated boxes (88%). ENV'T PROT. AGENCY, ADVANCING SUSTAINABLE MATERIALS MANAGEMENT: 2017 FACT SHEET 9 (2019), https://www.epa.gov/sites/default/files/2019-11/documents/2017_facts_and_figures_fact_sheet_final.pdf

56. Zoé O. G. Schyns & Michael P. Shaver, *Mechanical Recycling of Packaging Plastics: A Review*, 42 MACROMOLECULAR RAPID COMMS., at 3 (2021), https://onlinelibrary.wiley.com/doi/epdf/10.1002/marc.202000415.

57. *See id.*

conditions, the recycled PET bottle output will have a seventy-to-thirty ratio of virgin-to-recycled plastics.[58]

Beyond primary and secondary mechanical recycling, recycled plastics enter tertiary chemical recycling, which returns the polymers to their monomeric feedstock to produce certain types of fuel.[59] Plastic polymers unfit for tertiary recycling enter quaternary recycling, which recovers energy through pyrolysis processes.[60] All levels of plastics recycling involve petrochemicals or the combustion of petrochemicals for energy recovery: primary and secondary recycling requires the addition of fossil fuel-based virgin plastics feedstock, while tertiary and quaternary "recycling" involve the polluting combustion of plastic polymers for energy.

Effective product design should account for the limitations of plastics recycling. The overall volume of plastics placed in the economy must be reduced within sustainable limits by eliminating unnecessary single-use plastics and products designed for planned obsolescence. For plastics that cannot be reduced, design should aim to maximize resource efficiency by optimizing recycling rates through product design standards that limit the types of additives and polymers used in production. Plastics alternatives can also minimize the volume of plastics in the economy but should be carefully considered using a life-cycle analysis (LCA), which includes the amount of energy and resources required to manufacture plastics replacements. For instance, studies comparing thin plastic grocery bags with more durable cotton or paper alternatives have shown that cotton totes need to be reused 7,100 times to equal the environmental impact of a plastic bag when considering the full environmental impact under LCA.[61] Organic cotton bags fare even worse and need to be reused 20,000 times.[62] While thin plastic bags become insidious and harmful forms of plastic waste, they require far less energy to produce than paper or cotton. This simply underscores the importance of an LCA when comparing "green" alternatives to plastics,

58. *Id.* at 4.

59. *Id.* at 2-3.

60. *Id.* Pyrolysis is a thermal degradation process that occurs in the absence of oxygen at temperatures between 400 and 800˚C to transform plastic polymers into gases, liquid oil, and char, which can then be used for energy production. Alexander H. Tullo, *Amid Controversy, Industry Goes All In on Plastics Pyrolysis*, CHEM. & ENG'G NEWS (Oct. 10, 2022), https://cen.acs.org/environment/recycling/Amid-controversy-industry-goes-plastics-pyrolysis/100/i36.

61. *See* Renée Cho, *Plastic, Paper or Cotton: Which Shopping Bag is Best?*, COLUMBIA CLIMATE SCH. (Apr. 30, 2020), https://news.climate.columbia.edu/2020/04/30/plastic-paper-cotton-bags/.

62. *Id.*

to better understand which materials should be used in each circumstance to achieve a net positive impact on the environment.

3. Downstream: Environmental Degradation, Human Rights, and the Marine Plastics Crisis

Nearly eighty percent of the global plastic waste trade is generated by developed countries.[63] Plastic waste trade primarily flows laterally with the majority of trade occurring between the United States, EU, and Southeast Asia countries.[64] High-income countries export millions of tons of plastic waste each year, as their domestic waste management capacity fails to keep pace with the increasing volume of plastics consumed within their borders.[65] Meanwhile, waste pickers in importing countries face increased risks of illness and human rights violations, as they provide a low-cost solution to the throwaway consumer culture of high-income countries.[66]

Wealthier countries thus create double standards by externalizing the health and environmental impacts on the most vulnerable.[67] To mitigate this externalization, France recently passed legislation to stop the export of chemicals prohibited domestically, even as the EU continues to export toxic industrial waste "resulting in widespread infringements of human rights to life, dignity and freedom from cruel, inhuman and degrading treatment in low and middle-income countries."[68]

The lack of any oversight mechanism regarding the recycling rates of exported plastic waste has led to international concern that these trade flows channel vast quantities of plastic waste into the oceans and the

63. U.N. CONF. ON TRADE & DEV., *supra* note 18.

64. The trade flows referenced here are based on figures from 2018, before China's ban on plastic waste imports took effect. Thus, this lateral trade flow is shifting due to China's ban, as well as the subsequent bans implemented by surrounding Southeast Asian nations. Barrowclough & Birkbeck, *supra* note 17, at 28. *See also* Martina Igini, *What are the Consequences of China's Import Ban on Global Plastic Waste?*, EARTH.ORG (Apr. 7, 2022), https://earth.org/chinas-import-ban/.

65. Barrowclough et al., *supra* note 1, at 25.

66. WORLD WIDE FUND FOR NATURE, WHO PAYS FOR PLASTIC POLLUTION? ENABLING GLOBAL EQUITY IN THE PLASTIC VALUE CHAIN, 5, 6, 22-23 (2023), https://wwfint.awsassets.panda.org/downloads/wwf-report—who-pays-for-plastic-pollution.pdf.

67. Press release, U.N. Hum. Rts. Off. of the High Comm'n, States Must Stop Exporting Unwanted Toxic Chemicals to Poorer Countries, Says UN Expert (July 9, 2020), https://www.ohchr.org/en/press-releases/2020/07/states-must-stop-exporting-unwanted-toxic-chemicals-poorer-countries-says-un.

68. *Id.*

natural environment.[69] Developing countries are disproportionately affected by the environmental and human health hazards of the plastic waste trade with a lifetime cost of plastic up to "10 times higher for low-income countries, even though they consume almost three times less plastic per-capita, than high-income ones."[70] As a result, the import of single-use plastics, and other plastics products greatly exacerbates the existing environmental burden on countries that lack capacity, infrastructure, and resources to manage (even their own) plastic waste.[71]

For decades, China has been the largest importer of plastic waste.[72] In recent years, the environmental burden of importing the West's plastic waste led China to ban all such imports through its National Sword Policy.[73] Experts estimate that "over 100 million metric tons of plastic waste will be displaced because of the policy."[74]

Just one year after China announced its ban, the international community (finally forced to contend with the garbage it creates) responded by launching the Basel Convention's Plastic Waste Amendments in 2019[75] and the World Trade Organization's (WTO) Informal Dialogue on Plastic Pollution and Environmentally Sustainable Plastics Trade (IDP) in 2020.[76] While plastics pollution is now touted as "one of the biggest environmental problems of our lifetime,"[77] uneven domestic adoption of international treaties continues to hamper meaningful participation from countries like the United States and Saudi Arabia, which have a

69. Brendan Lui, *US Waste Exporting Explained*, REPURPOSE (Apr. 16, 2019), https://repurpose.global/blog/post/us-waste-exporting-explained.

70. Susan McCarthy, *Lifetime Cost of Plastic 10 Times Higher for Low-Income Countries than Rich Ones, Revealing Crippling Inequities in Plastics Value Chain*, WORLD WILDLIFE FUND (Nov. 7, 2023), https://www.worldwildlife.org/press-releases/lifetime-cost-of-plastic-10-times-higher-for-low-income-countries-than-rich-ones-revealing-crippling-inequities-in-plastics-value-chain.

71. *Id.*

72. Igini, *supra* note 64.

73. *See generally* Cheryl Katz, *Piling Up: How China's Ban on Importing Waste Has Stalled Global Recycling*, YALE ENV'T 360 (Mar. 7, 2019), https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling.

74. *Scientists Calculate Impact of China's Ban on Plastic Waste Imports*, UNIV. OF GA. (June 10, 2018), https://engineering.uga.edu/scientists-calculate-impact-of-chinas-ban-on-plastic-waste-imports/.

75. *Geneva Beat Plastic Pollution Dialogues*, GENEVA ENV'T NETWORK (Feb. 4, 2021), https://www.genevaenvironmentnetwork.org/fr/evenements/geneva-beat-plastic-pollution-dialogues-plastics-and-trade.

76. Press release, World Trade Org., Informal Dialogue on Plastic Pollution and Environmentally Sustainable Plastics Trade (Dec. 10, 2021), https://www.wto.org/english/thewto_e/minist_e/mc12_e/idp_press_background.pdf.

77. Deena Robinson, *15 Biggest Environmental Problems of 2024,* EARTH.ORG (Jan. 3, 2024), https://earth.org/the-biggest-environmental-problems-of-our-lifetime.

significant impact on the global plastics pollution crisis. Notably, the United States is not a party to the Basel Convention.[78]

With the cumulative amount of plastic in the ocean estimated to reach 600 million tons by 2040,[79] there is no telling what the true toll on marine life, human health, and the environment will be. One thing is certain—since plastic takes over 400 years to decompose, the consequences of policy decisions made today will be borne by many generations to come.[80]

a. China's National Sword Policy and the International Response to Plastic Waste

In the 1980s, plastic waste served as a valuable means of bolstering China's domestic resource shortages.[81] This steady supply of high-quality materials provided cost savings and energy efficiency for the Chinese manufacturing industry by reducing the production of products from virgin resources.[82] The Chinese recycling industry also saw high profits until the rapid expansion of low-value plastics products overwhelmed recycling infrastructure and led to concern for the harmful health impacts of mismanaged imported plastic waste.[83]

In 2018, China implemented the National Sword policy, which bans twenty-four waste materials including eight types of post-consumer plastic waste.[84] As plastic waste exports were diverted to neighboring Southeast Asian countries, like Thailand and Malaysia, subsequent bans were implemented.[85] The bans forced exporting countries to recognize the magnitude of their plastic waste streams and prompted international dialogue regarding plastics pollution. The IDP was launched in 2020 to explore how enhanced cooperation in the WTO could contribute to global, regional, and domestic efforts to reduce plastics pollution and promote the transition to more environmentally sustainable trade in plastics.[86]

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78. *Basel Convention on Hazardous Wastes*, U.S. DEP'T. OF STATE, https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/basel-convention-on-hazardous-wastes (last visited Oct. 8, 2024); Barrowclough & Birkbeck, *supra* note 16, at 17.

79. Robinson, *supra* note 77.

80. *Id.*

81. Igini, *supra* note 64.

82. *Id.*

83. *Id.*

84. *Id.*

85. *Id.*

86. *See Plastics Pollution and Environmentally Sustainable Plastics Trade*, WORLD TRADE ORG., https://www.wto.org/english/tratop_e/ppesp_e/ppesp_e.htm (last visited Oct. 8, 2024).

The IDP is co-sponsored by seventy-five members, representing roughly seventy-five percent of global trade in plastics.[87] Notably absent are the United States and Saudi Arabia, which represent the top two exporting countries for primary plastics.[88] Since UNEA's historic End Plastic Pollution resolution, countries have split on how the legally binding treaty should be forged.[89] The High Ambition Coalition to End Plastic Pollution includes the EU and over sixty countries, including Norway, Britain, Canada, Uruguay, Rwanda, and Ghana, which are in favor of a treaty based on mandatory global standards, bans, and restrictions on plastics.[90]

The United States, Saudi Arabia, Australia, and others have started their own coalition advocating for a treaty that resembles the Paris Agreement, in favor of a country-driven approach to architect their own "national action plans" as the "primary mechanism" for countries to contribute to the treaty.[91] However, the United States' approach lacks an enforcement mechanism, "coordinated curbs on virgin plastics production, and universal design standards to increase the recyclability of plastics."[92] Although it is far from ideal, trade policy measures that do not require U.S. congressional approval should be explored because the lack of political will for an internationally legally binding treaty aimed at curbing plastics production and pollution poses a significant challenge to U.S. participation in ending plastics pollution.

For example, while the United States is not a party to the Basel Convention, the new Basel provisions "will have significant impacts on exports and imports of U.S. plastic recyclables because many U.S. trading partners will implement the Basel plastic scrap and waste amendments … [and] the Basel Convention … prohibits trade between countries that have ratified the Convention (i.e., Parties) and non-Party

87. CAROLYN DEERE BIRKBECK ET AL., THE WTO DIALOGUE ON PLASTICS POLLUTION: OVERVIEW AND STATE OF PLAY 1 (2022), https://cdn2.assets-servd.host/lyrical-cormorant/production/assets/images/Publications/TESS-Policy-Brief-The-WTO-Dialogue-on-Plastics-Pollution.pdf?dm=1678460889.

88. Barrowclough & Birkbeck, *supra* note 17, at 17.

89. John Geddie & Valerie Volcovici, *Exclusive: U.S. Seeks Allies as Split Emerges Over Global Plastics Pollution Treaty*, REUTERS (Sep. 27, 2023), https://www.reuters.com/world/exclusive-us-seeks-allies-split-emerges-over-global-plastics-pollution-treaty-2022-09-27.

90. *HAC Ministers Call for Areas of Convergence in Plastic Treaty Talks*, INT'L INST. FOR SUSTAINABLE DEV. (Apr. 18, 2024), https://sdg.iisd.org/news/hac-ministers-call-for-areas-of-convergence-in-plastic-treaty-talks.

91. Geddie & Volcovici, *supra* at note 89.

92. *Id.*

countries."[93] Yet, much uncertainty remains around the enforceability of the Convention, including outstanding legal questions of WTO compatibility.[94]

b. The Basel Convention Plastic Waste Amendments

In 2019, 187 States Parties to the Basel Convention adopted the Plastic Waste Amendments and launched the Plastic Waste Partnership to support the environmentally sound management of plastic waste.[95] The Basel Convention regulates hazardous waste to ensure it is "managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes."[96] Effective January 2021, the Plastic Waste Amendments include: (1) types of plastic waste presumed to be hazardous and therefore subject to prior informed consent (PIC) procedure;[97] (2) plastic waste presumed to not be hazardous and not subject to PIC procedure;[98] and (3) all other plastics that require special consideration and subject to PIC procedures.[99] Under the Plastic Waste Amendments, exporters of hazardous and mixed plastic waste streams must comply with PIC procedures, which include: (1) notification; (2) consent and issuance of movement document; (3) transboundary movement; and (4) confirmation of disposal.[100] PIC procedures serve as a form of international oversight by requiring the importer to confirm environmentally sound disposal of plastic waste.

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93. *New International Requirements for the Export and Import of Plastic Recyclables and Waste*, ENV'T PROT. AGENCY (Aug. 26, 2024), https://www.epa.gov/hwgenerators/new-international-requirements-export-and-import-plastic-recyclables-and-waste.

94. Birkbeck, *supra* note 25, at 33.

95. *See Geneva Beat Plastic Pollution Dialogues*, *supra* note 75.

96. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, art. 2, Mar. 22, 1989, 1673 U.N.T.S. 57 [hereinafter *Basel Convention*].

97. Secretariat of the Basel Convention, *Basel Convention Plastic Waste Amendments*, BASEL CONVENTION https://www.basel.int/Implementation/Plasticwaste/Amendments/Overview/tabid/8426/Default.aspx (last visited Oct. 8, 2024); *see Basel Convention*, *supra* note 96, Annex VII (adding entry A3210).

98. Secretariat of the Basel Convention, *supra* note 97; s*ee Basel Convention*, *supra* note 96, Annex IX (replacing B3010 with new entry B3011).

99. Secretariat of the Basel Convention, *supra* note 97; *see Basel Convention*, *supra* note 96, Annex II (new entry Y48, catchall provision that covers all other plastic waste and mixed plastic waste that is not included in A3210 or B3011).

100. Secretariat of the Basel Convention, *Controlling Transboundary Movements*, BASEL CONVENTION, https://www.basel.int/Implementation/Controllingtransboundarymovements/Overview/tabid/4325/Default.aspx. (last visited Oct. 8, 2024).

Exporters must also show they either lack technical capacity for environmentally sound management domestically or that the importing nation requires the plastics waste stream as raw material for recycling or recovery industries, or other approved circumstances.[101] The Plastic Waste Partnership furthers these commitments by providing technical support and guidelines for the environmentally sound management (ESM) of waste together with the ESM Framework.[102]

While this marks an important milestone in global governance as the first successful multilateral environmental agreement (MEA) to manage plastic waste trade, enforcement relies entirely on Member States to voluntarily establish domestic legislation and regulations to enforce compliance with the Convention. The United States is one of the few countries that have not ratified the Convention, and is unlikely to ratify it in the near future.[103] The United States is also the largest producer of plastic waste, generating forty-two million metric tons of plastic waste per year (nearly 290 pounds per person).[104] Without ratification, the United States is limited in its ability to directly enforce compliance with the Plastic Waste Amendments and to prosecute plastic waste exporters that trade in violation of its provisions. However, U.S. exports and imports of plastic waste are "subject to applicable laws and regulations in the country or countries that control the waste, as well as any applicable international agreement, such as the Basel Convention," thereby creating the potential for an effective, indirect enforcement mechanism of U.S. plastic waste, vis-à-vis its trading partners' ratification of the Convention.[105]

Yet, enforcing the Convention may also give rise to outstanding legal questions of WTO compatibility.[106] The Convention's prohibition on "[p]arties from trading in [plastic waste] subject to PIC with non-Parties"[107] without an applicable exception under Article 11, may be

101. *Id.*

102. *See* Secretariat of the Basel Convention, *Plastic Waste Partnership*, BASEL CONVENTION, https://www.basel.int/Implementation/Plasticwaste/PlasticWastePartnership/tabid/8096/Default.aspx (last visited Oct. 8, 2024).

103. Office of Env't Quality, *Basel Convention on Hazardous Wastes*, U.S. DEP'T. OF STATE, https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/basel-convention-on-hazardous-wastes (last visited Oct. 8, 2024).

104. Olivia Lai, *8 Shocking Plastic Pollution Statistics to Know About*, EARTH.ORG (May 25, 2024), https://earth.org/plastic-pollution-statistics.

105. *New International Requirements for the Export and Import of Plastic Recyclables and Waste*, ENV'T PROT. AGENCY, https://www.epa.gov/hwgenerators/new-international-requirements-export-and-import-plastic-recyclables-and-waste (last visited Oct. 8, 2024).

106. Birbeck, *supra* note 25, at 33.

107. *Id.*

considered a violation of the General Agreement on Tariffs and Trade (GATT) Article I (Most Favored Nation Treatment).[108] Under the GATT, a country that is a signatory to the Basel Convention may be found to be in violation of Article I for "refus[ing] a shipment of a waste product from a country . . . which is *not* a signatory . . . while accepting a shipment of an equivalent ['like'] product from [a] country . . . that *is* a party to the convention."[109] While "no trade-related measures taken by governments in the context of MEAs have been the explicit subject of any trade challenges"[110] to date, enforcing minimum environmental standards set by MEAs like the Basel Convention face numerous challenges due to the voluntary nature of commitments and the uneven domestic ratification of signatories.

c. Marine Plastics Crisis and Human Health

The stakes are high for current international efforts to effectively address the plastics pollution crisis. Plastics are the "largest, most harmful and persistent fraction of marine litter, accounting for at least 85% of total marine waste."[111] Plastics reduce valuable marine ecosystem services by at least USD 500 billion to USD 2.5 trillion each year, not including social and economic losses from industries like tourism and shipping.[112]

Microplastics and nanoplastics have become so pervasive that these plastics particles are inhaled through the air, absorbed by the skin, and consumed through food and water.[113] Microplastics are found in human lungs, livers, spleens, kidneys, and even the placenta of newborn babies.[114] While the full impact on human health remains unknown, these chemicals are known to lead to endocrine disruption, developmental disorders, reproductive abnormalities, and cancer.[115]

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108. *Id.*

109. *Id.* (emphasis added).

110. *Id.*

111. *Plastics and the Environment: Plastic Pollutions Around the World*, GENEVA ENV'T NETWORK, https://www.genevaenvironmentnetwork.org/resources/updates/plastic-pollution-around-the-world/.(last updated Sep. 1, 2024).

112. *From Pollution to Solution*, U.N. ENV'T PROGRAMME, https://www.unep.org/interactives/pollution-to-solution (last visited Oct. 8, 2024).

113. *Methods for Microplastics, Nanoplastics and Plastic Monomer Detection and Reporting in Human Tissues*, AM. CHEM. SOC'Y (Aug. 17, 2020), https://www.acs.org/pressroom/newsreleases/2020/august/micro-and-nanoplastics-detectable-in-human-tissues.html.

114. *Id.*

115. U.N. ENV'T PROGRAMME, *supra* note 9.

Waste workers, indigenous communities, and those living in coastal communities or near incineration facilities are at much higher risk.

Given the complexity of environmentally sound waste management coupled with the low economic benefits and technical limitations of recycling plastics, China's implementation of its National Sword Policy exposed the massive market failure of plastics recycling.[116] The decades-long reliance on China has "stifled the development of the domestic market and infrastructure for waste management in [the United States and] many European countries … including Germany and Belgium."[117] It appears that no nation is prepared "to take in such large amounts of trash produced by the rest of the world," or willing to put its nation's environment and citizens' health at risk.[118] As more import markets stop accepting waste, the bans force exporting countries to "find new ways to deal with their own waste and implement new policies aimed at reducing overall plastic circulation."[119]

III. CONTOURS OF A CIRCULAR PLASTICS ECONOMY

A circular economy is critical to achieving emissions mitigation goals set forth by the Paris Agreement while continuing to meet the needs of our modern economy. The heaviest emitting industries at the foundation of our economy include plastics, cement, steel, and aluminum.[120] Global transformation of these heavy emitting industries towards a more circular economy has the potential to reduce 3.6 billion tons of CO_2 emissions per year by 2050, which represents nearly forty-five percent of baseline emissions.[121] The transition to a circular economy is also estimated to represent a USD 4.5 trillion global growth opportunity by 2030.[122] Plastics have the largest potential to improve circularity given the currently low recycling rates (less than ten percent).[123] Mechanical recycling of plastics can also substantially decarbonize new plastics production by reducing CO_2 emissions by thirty to forty

116. Katz, *supra* note 73.

117. Igini, *supra* note 64.

118. *Id.*

119. *Id.*

120. MATERIAL ECON., THE CIRCULAR ECONOMY: A POWERFUL FORCE FOR CLIMATE MITIGATION 4 (2018), https://materialeconomics.com/node/14.

121. *Id.*

122. Frans van Houten & Naoko Ishii, *It's Time for the Circular Economy to Go Global - and You Can Help*, WORLD ECON. FORUM (Jan. 24, 2019), https://www.weforum.org/agenda/2019/01/its-time-for-the-circular-economy-to-go-global-and-you-can-help/.

123. U.N. ENV'T PROGRAMME, *supra* note 9.

percent when compared with emissions associated with virgin polymer production.[124]

As economies develop and populations grow, plastics consumption increases with global plastics production projected to double to over 800 million tons per year by 2050.[125] Policy measures that incentivize reuse and recycling can provide up to sixty percent of the world's plastics demand, cutting CO_2 emissions by half.[126] Achieving a more circular plastics economy requires transformation at every stage of the plastics lifecycle, including a sharp reduction in production.

Single-use plastics have become a target for policymakers, as outright bans on plastic bags and straws seek to reduce the volume of unnecessary plastics packaging that become insidious forms of microplastics pollution.[127] Product design using high-value materials that are easy to sort and clean, coupled with increased investment in advanced recycling facilities that expand the scope and scale of collection and recycling, can transform plastics recycling into an economically viable industry. Policy measures that establish a quota system for minimum recycled content can also help incentivize investment in recycling facilities by ensuring market demand for secondary plastics output.[128]

Enormous economic value is currently lost in the plastics economy. Circularity maximizes resource efficiency by capturing the inherent commercial value of plastic waste streams while mitigating emissions and the energy intensive production of primary materials. Effective trade policy supporting the transition from a take-make-waste business model to one that recaptures or recycles the economic value of plastics packaging material used only once, can unlock an estimated USD 80-120 billion in lost value to the global economy annually.[129] Trade measures may also address barriers to circularity across the lifecycle of plastics by liberalizing resource-efficient products and technology.

For developing nations, plastics offer a path to development, increased quality of life, and an expansion of economic opportunity. Policy measures supporting a circular plastics economy must consider

124. DOMINIC CHARLES AND LAURENT KIMMAN, MINDEROO FOUND., PLASTIC WASTE MAKERS INDEX 32 (2023), https://www.minderoo.org/plastic-waste-makers-index/.

125. MATERIAL ECON., *supra* note 120, at 78.

126. *Id.* at 82.

127. Courtney Lindwall, *Single-Use Plastics 101*, NRDC (Apr. 30, 2024), https://www.nrdc.org/stories/single-use-plastics-101.

128. MATERIAL ECON., *supra* note 120, at 94.

129. ELLEN MCARTHUR FOUND., THE NEW PLASTICS ECONOMY: RETHINKING THE FUTURE OF PLASTICS AND CATALYSING ACTION (2017) https://www.ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics-and-catalysing.

the impacts that production and reporting standards for plastics products may have on developing countries and LDCs. Investment in technical capacity, training, and the liberalization of recycling technology must also be prioritized for developing countries that have become dumping grounds for plastic waste.

A. *The Complementary Role of MEAs and TAs to Promote Circular Plastics Trade*

A multilateral approach to addressing the global problem of plastics pollution provides the benefit of international coordination on policy measures aimed at phasing out virgin, single-use plastics and other unrecyclable or toxic plastics from international trade. Yet, the enforceability of multilateral environmental agreements (MEAs) is limited due to the voluntary nature of MEA commitments, which must be ratified domestically to create a legally binding enforcement mechanism. For example, the United States signed the Stockholm Convention in 2001 but has never domestically ratified the Convention and therefore lacks the authority to enforce the full implementation of its provisions.[130]

Some countries have sought to spur ratification of MEAs by conditioning trade agreements (TAs) to countries that ratify and implement MEA commitments.[131] Recently, several EU Member States have threatened to vote against ratification of the EU-Mercosur trade agreement until Brazil has satisfactorily ratified Paris Agreement commitments through sufficient domestic legislation.[132] By conditioning legally binding TAs on the domestic ratification of MEA provisions, regional plurilateral TAs can encourage the adoption and enforceability of voluntary MEAs, while MEAs lay the foundation for global coordination to prioritize multilateral environmental targets, cooperative monitoring mechanisms, technology transfer, and other commitments that support an end to plastics pollution. As such, new and existing MEAs may be carefully crafted or amended to support the three broad targets,[133] while new and existing TAs are conditioned upon ratification of MEA provisions.

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130. Off. of Env't Quality, *Stockholm Convention on Persistent Organic Pollutants*, U.S. DEP'T OF STATE, https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/stockholm-convention-on-persistent-organic-pollutants/ (last visited Oct. 8, 2024).

131. Birkbeck, *supra* note 25, at 34.

132. *Id.*

133. Three high-level targets: (1) commit to recycled polymers targets of at least 25% of production by 2030 (2) end plastics pollution by 2040, and (3) decarbonize the plastics sector to reach net zero by 2045.

Although multilateral agreements have distinct advantages for addressing a global crisis, plurilateral regional TAs as well as unilateral action by countries can quickly initiate critical action to limit virgin plastics production and mitigate the plastics pollution crisis. Further, multilateral consensus may ultimately prove inadequate to respond to the mounting environmental crisis in a timely manner. Delaying action to cut back plastics production and consumption by even five years is estimated to increase plastics pollution in the ocean by approximately eighty million metric tons.[134]

B. *Upstream Policy Measures*

1. Adapting the Montreal Protocol to Phase Out Virgin Plastics Polymer Production

Decarbonizing the plastics industry requires the decoupling of plastics production from fossil fuels. Over ninety percent of plastics are made from virgin fossil-fuel feedstock and represent about six percent of global oil consumption.[135] Under business-as-usual projections, the plastics sector will account for fifteen percent of the Paris Agreement's global annual carbon budget by 2050[136] and generate more carbon emissions than coal by 2030.[137] Over a third of all plastics manufactured each year are single-use plastics.[138] Single-use plastics are particularly harmful because they are generally used only once and are difficult to recycle because they are made of low-value plastic material, are often contaminated by food, or are mixed with other packaging materials, dyes, and toxic chemicals that cannot safely be recycled.[139] Unsurprisingly, the vast majority of single-use plastics are discarded with "around 90% of all plastic waste ever produced . . . used just once."[140] Single-use plastic waste is largely exported to developing countries that lack the capacity for environmentally sound

134. *How Multiple Countries are Working Together to End Plastic Pollution by 2040,* WORLD ECON. FORUM (Sep. 22, 2022), https://www.weforum.org/agenda/2022/09/roadmap-to-end-plastic-pollution-by-2040/.

135. This is the equivalent to the consumption of the global aviation sector. WORLD ECON. FORUM, THE NEW PLASTICS ECONOMY RETHINKING THE FUTURE OF PLASTICS 7 (2016), https://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf.

136. *Id.*

137. Igini, *supra* note 64.

138. *Plastic Waste Makers Index,* SOURCE OF PLASTIC WASTE, https://sourceofplasticwaste.org/ (last visited Oct. 8, 2024).

139. Lindwall, *supra* note 127.

140. Tim Grabiel et al., *Achieving Sustainable Production and Consumption of Virgin Plastic Polymers,* 9 FRONTIERS MARINE SCI. 1, 3 (2022).

management, creating grave environmental and human health hazards. Upstream policy measures that rein in plastics production within sustainable levels are critical to achieving a more circular plastics economy.

The Montreal Protocol on Substances that Deplete the Ozone Layer has been touted as "one of the most successful examples of trade-related cooperation."[141] This treaty regulates the production and consumption of ozone depleting substances (ODS), and has successfully phased out ODS like chlorofluorocarbons (CFCs) through a flexible start-and-strengthen approach that enables the "gradual strengthening of controls over time as new information and alternatives become available."[142] Taking a similar start-and-strengthen approach, the production and consumption of virgin plastic polymers could be regulated and largely phased out of international trade.[143]

Adapting the Montreal Protocol for plastics first requires the categorization of virgin plastics by polymer type (in an annex as "controlled substances") with new polymers added via decisions by the parties without need for further ratification.[144] Once plastic polymers are categorized, parties are required to report on the production and consumption of each "controlled substance."[145] As with the Montreal Protocol, developing countries may receive technical and financial assistance to comply with mandatory reporting obligations.[146] The feasibility of gathering this data is greatly aided by the fact that there are only approximately 300 virgin polymer producers worldwide, with 100 producers accounting for nearly ninety percent of all single-use plastics production.[147]

Based on these reports, parties then adopt restrictions on annual production and consumption of controlled substances at certain baseline levels that serve as a cap, followed by a "phase-down" to lower aggregate levels of production and consumption over time.[148] Setting the

141. Birkbeck, *supra* note 25, at 30.

142. Grabiel et al., *supra* note 140, at 3.

143. *See id.*

144. Modeled after Article 2 of Montreal Protocol which imposes control measures on production and consumption of "controlled substances" listed in Annexes A, B, C, E, and F. *See* Grabiel et al., *supra* note 140, at 3.

145. Based on reporting requirements of Article 7 of the Montreal Protocol. "'Production' should refer to the amount of virgin plastic a country produces, with 'consumption' referring to the amount of virgin plastic a country consumes, calculated as production plus imports minus exports of virgin plastics." *Id.* at 4.

146. Grabiel et al., *supra* note 140, at 4.

147. CHARLES & KIMMAN, *supra* note 124, at 51.

148. *See* Grabiel et al., *supra* note 140, at 5.

baseline and subsequent phase-down of virgin polymers to target levels that require recycled polymers to constitute at least twenty-five percent of plastics production by 2030, will likely result in a temporary freeze on virgin polymer production while simultaneously generating substantial market demand for secondary plastics. Controls on virgin polymer production may also be tailored to phase-down unrecyclable plastic polymers first.

Plastics can be broken down into two broad categories: (1) "thermoplastics, which can be melted and remolded (∼80%)," and (2) "thermosets, which cannot be remelted and remolded (∼20%)."[149] By initially targeting hard-to-recycle plastics (thermosets), low-value plastics (single-use), and plastics containing "high concentrations of toxic chemicals for which alternatives are readily available,"[150] a phase-out schedule optimized for circularity can be achieved to end plastic pollution by 2040 and decarbonize the plastics industry by 2045.

2. Expanding Stockholm Convention POPs to Include Toxic Additives Commonly Used in Plastics Production

Plastics containing toxic additives that are unsafe to recycle cannot support a circular plastics economy and pose enduring risk to human and environmental health. The Stockholm Convention is "a global treaty to protect human health and the environment from persistent organic pollutants (POPs)."[151] POPs are chemicals that persist in the environment without degrading for long periods of time, disperse broadly across geographic regions, build up in the fatty tissue of living organisms and pose toxicity risks to humans and wildlife.[152] These toxic chemical additives are prime candidates for inclusion as POPs because they can linger in the environment for hundreds to over a thousand years, accumulate in marine life, and are widely distributed geographically.[153] Some studies estimate that humans ingest up to one credit

149. Grabiel et al., *supra* note 140, at 3.

150. "Such as polyvinyl chloride (PVC), polystyrene (PS), polyurethane (PUR) and polycarbonate (PC), which collectively comprise 30% of total market share." Grabiel et al., *supra* note 140, at 5.

151. Off. of Env't Quality, *supra* note 130.

152. *Stockholm Convention*, U.N. INDUST. DEV. ORG., https://www.unido.org/our-focus-safeguarding-environment-implementation-multilateral-environmental-agreements/stockholm-convention (last visited Nov. 23, 2024).

153. Ali Chamas et al., *Degradation Rates of Plastics in the Environment*, 8 ACS SUSTAINABLE CHEM. & ENG'G 3494, 3503 (2020).

card's worth of plastic per week.[154] Certain types of plastics are known to be endocrine disruptors that lead to various diseases.[155]

Exposure to microplastics have become so universal that "almost everyone has EDCs [endocrine-disrupting chemicals] in their bodies."[156] While these additives perform useful functions in plastics, including polyvinyl chloride (PVC), polystyrene (PS), polypropylene (PP), polyurethane (PU), and nylon, as flame retardants, plasticizers, and heat or ultraviolet (UV) stabilizers, safer alternatives currently exist to replace many of these applications.[157] Phasing out these harmful chemicals that render plastics products unsafe to recycle by including them as POPs under the Stockholm Convention supports market-demand for toxic-free alternatives, investment in the development of substitutes, and promotes a circular plastics economy.

3. Applying the Montreal Protocol Licensing System, Prohibition of Trade with Non-Parties, and Critical-Use Exemptions to the Regulation of Virgin Plastics Polymers

A cross-border licensing system, similar to the one implemented in the Montreal Protocol and the Basel Convention, supports monitoring the flow of virgin plastics polymers and prevents these substances from being traded illegally.[158] Under a licensing system, only licensed companies can produce, import, or export, controlled substances, thereby banning the unlicensed (and unregulated) production, import, and export of virgin plastics polymers.[159] Provisions prohibiting trade of controlled substances with non-parties, modeled after Article 4 of the Montreal Protocol, also work to maximize participation and compliance.[160] Finally, exemptions for critical-use applications (i.e., for use in the medical industry) allow a country to use a specific amount of controlled substance for a period of time and provide flexibility for plastics considered essential for society until alternatives are available and commercialized to replace the use of controlled substances.[161]

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154. *See e.g.*, Martin Pletz, *Ingested Microplastics*, 3 J. HAZARDOUS MATERIALS LETTERS 1, 1 (2022).

155. *Household Plastic Products Disrupt Endocrine System, Threaten Human Health*, SDG KNOWLEDGE HUB (Jan. 13, 2021), https://sdg.iisd.org/news/household-plastic-products-disrupt-endocrine-system-threaten-human-health/.

156. *Id.*

157. *See generally Development of ECOlogical Friendly and Flexible Production Processes for Textile COATings Based on Innovative Polyolefine Polymer Formulations,* CORDIS (Dec. 31, 2011), https://cordis.europa.eu/project/id/232411/reporting

158. *See* Grabiel et al., *supra* note 140, at 4.

159. *See* Grabiel et al., *supra* note 140, at 4.

160. "The Montreal Protocol was the first UN treaty to receive universal ratification." *Id.* at 5.

161. *See* Grabiel et al., *supra* note 140, at 5.

C. *Midstream Policy Measures*

1. Adapting Plurilateral Carbon Clubs to Phase Out Virgin, Single-Use Plastics and Incentivize Resource-Efficient Plastics Product Design

Voluntary, multilateral agreements have historically taken years to achieve[162] and can also induce free-riding, whereby "countries have an incentive to rely on the . . . reductions of others without making costly domestic reductions themselves."[163] The concept of a Carbon Club addresses these concerns as countries "unilaterally and sequentially introduce [border adjustment taxes] on their imported goods."[164] Therefore, a Carbon Club represents a collection of parallel unilateral measures, rather than a single, collectively negotiated framework.[165] As more countries join a Carbon Club, the incentive to join becomes greater.[166]

Adapting the model of a plurilateral Carbon Club to address the plastics pollution crisis can strengthen and even catalyze multilateral efforts. To start a Plastics Club, countries may take unilateral action to impose a border adjustment tax through a differentiated tariff schedule with the aim of reducing or eliminating the use of virgin single-use plastics, encouraging trade in bioplastics and plastics alternatives, and economically incentivizing trade in recycled plastics. A differentiated tariff schedule that provides varying degrees of market access could promote plastics circularity, domestically capturing lost economic value inherent in plastic waste to spur new market opportunities and job creation.[167] While governments may choose to take immediate unilateral action, regional cooperation through legally binding trade agreements is

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162. "The Paris Agreement has taken years to negotiate and we still have countries submitting NDCs [emissions reductions targets] using incomparable frameworks." David Vetter, *As The World Heats Up Could 'Carbon Clubs' Supercharge Climate Action?*, FORBES (Feb. 16, 2022), https://www.forbes.com/sites/davidrvetter/2022/02/16/as-the-world-heats-up-could-carbon-clubs-supercharge-climate-action/?sh=702876c9d36f.

163. William Nordhaus, *The Climate Club: How to Fix a Failing Global Effort*, FOREIGN AFFS. (Apr. 10, 2020), https://www.foreignaffairs.com/articles/united-states/2020-04-10/climate-club.

164. Bethan Adams et al., *The Carbon Club Revisited: Harnessing Enterprise and Trade to Decarbonize the Global Economy* 3 (Oxford Smith Sch. of Enter. & the Env't, Working Paper No. 22-01, 2022), https://www.smithschool.ox.ac.uk/sites/default/files/2022-02/The-Carbon-Club-Revisited.pdf.

165. *Id.*

166. Dieter Helm et al., *Trade, Climate Change, and the Political Game Theory of Border Carbon Adjustments* 25 (Ctr. for Climate Change Econ. & Pol'y, Working Paper No. 92; Grantham Rsch. Inst. on Climate Change & the Env't, Working Paper No. 80, 2012), https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2012/04/Trade-climate-change-game-theory-border-carbon-adjustments.pdf.

167. Birkbeck, *supra* note 25, at 35.

necessary to avoid leakage of undesirable plastics products to neighboring markets.

Harnessing market forces to shift virgin plastics production through unilateral and plurilateral regulations via the formation of a Plastics Club, can quickly send a powerful message to the commercial markets. Setting a border adjustment tax and differentiated tariff schedule that incentivizes resource-efficient plastics product design (including recycled content minimums, bioplastics, and plastics alternatives) while phasing out fossil fuel-based, single-use plastics will give shareholders of the world's corporations clear financial incentives to divest from the production of virgin plastics and to invest in the circular plastics economy.[168]

a. Banning Single-Use Plastics: WTO Compliance Considerations

Article XI of the GATT generally prohibits WTO Members from imposing export or import bans on goods "made effective through quotas, import or export licenses or other measures" subject to limited exceptions.[169] Governments may, nonetheless, impose a ban on primary, fossil fuel-based, single-use plastics "provided any restrictions equally apply nationally and do not discriminate between exporters."[170] India, the fifth highest generator of plastic waste in the world, attempted to impose a ban on a small fraction of its single-use plastics accounting for two to three percent of India's total plastic waste while exempting big businesses like PepsiCo and Coca-Cola.[171] India's ban failed after three months due to a lack of community-level support and little to no government assistance for those impacted by the new regulations to transition to affordable alternatives.[172]

China has also implemented a ban on certain categories of single-use plastics which will be phased in over a five-year period beginning in

168. "You can have strong regulation for the future, then the financial market will start investing today, for that future. Because that's what markets do, they always look forward." Fiona Harvey, *Regulate Business to Tackle the Climate Crisis, Urges Mark Carney*, GUARDIAN (July 17, 2021), https://www.theguardian.com/environment/2021/jul/17/regulate-business-to-tackle-climate-crisis-urges-mark-carney.

169. General Agreement on Tariffs and Trade, Art. XI § 1, Oct. 30, 1947, 61 Stat. A-11, 55 U.N. T.S. 194 [hereinafter GATT].

170. *Id.*

171. Tanvi Deshpande, *Three Months On, India's Single-Use Plastic Ban a Dud*, INDIASPEND (Oct. 1, 2022), https://www.indiaspend.com/pollution/three-months-on-indias-single-use-plastic-ban-a-dud-837111.

172. *Id.*

2020.[173] Implementing a ban in phases creates a better chance that the ban will succeed by providing the impacted industry time to come into compliance. It seems unlikely that the United States would be able to pass a meaningful federal ban on single-use plastics since it was one of the few countries that opposed an "initial proposal to phase out single-use plastic by 2025" during the Fourth U.N. Environment Assembly, where 170 countries pledged to "significantly reduce" the use of plastics by 2030.[174] If the United States, as the largest importer of plastics packaging, were to phase in a domestic ban on several categories of single-use plastics made from virgin polymers and apply the ban equivalently to all single-use plastics imports, this would send a strong signal to international markets to slow production of virgin plastics for single-use applications.

In the absence of an equivalent domestic ban, the United States could still impose a ban on fossil fuel-based, single-use plastics imports under an Article XX(b) exception as a measure "necessary to protect human, animal or plant life or health," or an Article XX(g) exception for measures "relating to the conservation of exhaustible natural resources if such measures made effective in conjunction with restrictions on domestic production or consumption."[175]

Given the vast data showing the harmful human and environmental impacts of plastic waste pollution, a ban on fossil fuel-based, single-use plastics would likely fit under one or both of these paragraphs. However, the measure must also satisfy the introductory paragraph *chapeau* to qualify as an Article XX exception; a high standard to meet as only two cases have prevailed.[176] A ban must also be carefully crafted to satisfy WTO principles of non-discrimination and transparency.[177] A country imposing a ban or other environmental measure may also seek

173. *See* Joe Myers, *China has Announced Ambitious Plans to Cut Single-Use Plastic*, WORLD ECON. FORUM (Jan. 20, 2020), https://www.weforum.org/agenda/2020/01/china-has-an-announced-ambitious-plans-to-cut-single-use-plastic/.

174. *World Pledges to Protect Polluted, Degraded Planet as it Adopts Blueprint for More Sustainable Future*, U.N. ENV'T PROGRAMME (Mar. 15, 2019), https://www.unep.org/news-and-stories/press-release/world-pledges-protect-polluted-degraded-planet-it-adopts-blueprint.

175. GATT, *supra* note 169, at Article XX.

176. Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products*, WTO Doc. WT/DS58/AB/RW (Oct. 22, 2001); Appellate Body Report, *European Communities – Measures Affecting Asbestos and Asbestos-Containing Products*, WTO Doc. WT/DS135/AB/R (Mar. 12, 2001).

177. Birkbeck, *supra* note 25, at 34.

to undertake good faith consultations with trading partners prior to implementation to avoid trade tensions and disputes.[178]

b. Leveling the Playing Field Between Primary and Secondary Plastics

The GATT does allow export and import restrictions through duties and taxes as long as they do not violate WTO principles of national treatment (which prohibits discrimination between foreign and domestically produced goods) and most favored nation (which prohibits discrimination among trading partners).[179] Through the use of a differentiated tariff schedule, governments may vary the degree of market access provided to unsustainable fossil fuel-based, single-use virgin plastics by charging high tariffs, thereby indirectly combating fossil fuel subsidies that distort the true cost of "cheap" virgin plastics. Governments may also lower or eliminate tariffs and non-tariff barriers to trade for plastics alternatives, like bioplastics, and high-value plastic waste to incentivize the trade in secondary plastics.

Through a differentiated tariff schedule, preferential market access may be granted to sustainably produced plastics products that meet certain environmental standards such as containing twenty-five percent minimum recycled content. For example, the trade agreement between the European Free Trade Association (EFTA) and Indonesia bases its preferential tariff treatment on the compliance of specific voluntary environmental standards for palm oil production.[180] Domestic measures that impose equivalent taxes on local products, to tariffs charged on imported "like" products bring the border adjustment tax and differentiated tariff schedule on plastics into compliance with WTO national treatment. Border adjustment tax measures must also be carefully crafted to avoid discrimination among trading partners, and to avoid unfairly disadvantaging developing countries through costly compliance requirements.

Tax revenues may be invested in greening Aid-for-Trade for developing countries by providing technical assistance, training, infrastructure, and capacity building to assist these countries transition to a circular plastics economy and comply with any new international treaty obligations. Domestically, revenues may also support the development of plastic-free products, refill stations, plastics alternatives, and other advancements in recycling technology that promote a circular plastics economy.

178. *Id.*

179. GATT, *supra* note 169, at Article I & III.

180. Birkbeck, *supra* note 25, at 54.

Whether governments may differentiate between "like" products based on the sustainability of process and production methods (PPMs) is not yet settled.[181] This debate is particularly difficult in cases where no physical trace of any differentiation is left in the end-product, also known as non-product-related PPMs (NPR PPMs).[182] While PPMs are not prohibited *per se* under the GATT, there has been a "chilling effect" for PPM-based trade measures given the legal uncertainties surrounding WTO compliance.[183] Developing countries have long opposed the use of NPR PPMs, fearing a slippery slope to protectionist measures that developed countries may use to discriminate against developing countries' imports that are unable to comply with costly reporting requirements.[184] Resolving this legal debate could, however, assist countries in distinguishing "like" products based on environmental and social considerations, including human rights. PPM-trade measures sensitive to the diversity of circumstances in producing countries should take a flexible approach that focuses on environmental outcomes rather than the use of specific methods of technologies, especially those that may be unaffordable or unavailable in developing countries.[185] Common but differentiated responsibilities may also be relevant to temporarily exempt developing countries transitioning to a more circular plastics economy.

Suggestions for addressing the uncertainty surrounding PPMs include amending the WTO Technical Barriers to Trade Agreement (TBT) or issuing a declaration on PPMs by the WTO Ministerial Conference.[186] Yet these suggestions are both unlikely to succeed due to the required multilateral consensus of all WTO Members.[187] The lack of consensus on definitions, international standards, and official classifications are among the major challenges impeding multilateral coordination on the plastics pollution crisis. Another suggestion is for the introduction of rules of methods of production (ROMP) where "production methods could be based solely on government regulations" thus enabling goods from anywhere in the world the benefit of trade preferences via lower tariffs for products that conform to specified production methods.[188]

181. *Id.* at 39.
182. *Id.*
183. *Id.*
184. *Id.* at 40.
185. *Id.* at 41.
186. *Id.* at 39.
187. *Id.*
188. *Id.*

A government ROMP requiring a minimum of twenty-five percent recycled content could dramatically impact the demand for secondary plastics inputs. ROMP requirements might also incentivize the production of plastics or bioplastics using renewable energy sources, to decarbonize the plastics industry. Finally, a WTO Climate Waiver (similar to the Agreement on Trade-Related Aspects of Intellectual Property Rights Waiver on intellectual property obligations designed to support access to generic drugs for developing countries) can also fast-track a temporary waiver of WTO obligations in "carefully defined and limited circumstances to certain kinds of measures that relate to climate actions" to support the circularity of plastics by expanding the use of trade measures to differentiate between products made with primary fossil fuel-based plastics and products made with secondary plastics and bioplastics.[189]

2. Updating Official Classifications to Support the Implementation of MEAs, TAs, and Domestic Policy Measures for Plastics Circularity

Harmonized Commodity Description and Coding System (HS) updates to support trade policy promoting a circular plastics economy may include distinctions between plastics products by polymer type, chemical composition, and secondary plastics content. These distinctions in the HS may then be relied upon in a differentiated tariff schedule to provide preferential market access to products containing secondary plastics, easily recyclable plastics, or bioplastics. Restrictions and phase-outs of plastics products containing toxic chemicals, single-use virgin plastics, thermosets, and other unrecyclable plastics may be implemented based on the updated HS to spur demand for products designed for circularity.

Additionally, "fast-stream" customs mechanisms for high-value secondary plastics commodities can promote commercially viable recycling markets supporting the circular economy.[190] To support such a "fast-stream" mechanism, the HS code would need to make a distinction between hazardous and non-hazardous plastic wastes (destined for recycling). The Basel Convention's Plastic Waste Amendments subject hazardous and non-hazardous plastic waste to different restrictions, yet the HS code does not currently make any such distinction, thereby limiting the effectiveness of the Basel Convention's Plastic Waste Amendments and the efficiency of the secondary plastics trade.

189. *Id.* at 40.

190. *Id.* at 36.

a. Support for Customs Officials to Implement Border Controls for Plastics Circularity

Greening trade flows to restrict or ban unsustainable single-use primary plastics and plastics containing toxic chemicals, while promoting the flow of secondary plastics and plastics alternatives will require considerable investments in technical assistance, training, and capacity building of customs authorities. Revenues generated by a differentiated tariff schedule may also be allocated to support customs officials. The WCO hosts the Green Customs Initiative to "prevent the illegal trade in environmentally sensitive commodities and substances," such as ODS and toxic chemicals.[191] Enforcing the regulation of primary plastics and toxic chemical additives commonly used in plastics, could also be achieved through the support of the WCO Green Customs Initiative.

b. Promoting Plastics Circularity through International Standards for Plastics Product Design

Leveraging International Organization for Standardization (ISO) standards or other international standards to promote the standardization of plastics product design can serve as a powerful tool to support circularity in MEAs and regional TAs. The EU is currently attempting to set standards for all packaging through a proposed revision to its legislation on Packaging and Packaging Waste as part of the EU Green Deal's Circular Economy Action Plan.[192] Through this measure, the EU hopes to reduce unnecessary packaging and to standardize packaging to maximize recyclability, thereby reducing the need for virgin materials.[193] Establishing international standards for plastics product design that bans unrecyclable toxic additives and standardizes materials to maximize recyclability can significantly increase plastics circularity and reduce dependence on fossil fuel resource extraction.

Governments may also adopt MEAs, TAs, and domestic policy measures in compliance with the ISO or other international standard as defined by the TBT to receive the benefit of a safe harbor, or rebuttable presumption that these measures are also in compliance with the TBT. Codifying voluntary and non-binding ISO standards as minimum environmental requirements embodied in national law further provides

191. *Id.* at 51.

192. *See European Green Deal: Putting an End to Wasteful Packaging, Boosting Reuse and Recycling,* EUR. COMM'N (Nov. 30, 2022), https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7155.

193. *See id.*

governments with mandatory and legally binding plastics product design requirements within their respective markets.[194] The adoption of such international standards can help to clarify confusion around the recyclability of various plastics and bioplastics.

For example, in the United States there is currently no mechanism to compost bioplastics or plastics marked as "compostable" because these cannot be recycled with other fossil fuel-based plastics and require a high heat industrial composting facility to break down.[195] Bioplastics and compostable plastics are marked under Resin Identification Code 7, which is a catch-all identification code for all miscellaneous plastics making it essentially impossible for curbside recycling programs to distinguish bioplastics or compostable plastics from non-recyclable plastics within this code.[196] Therefore, these bioplastics and compostable plastics largely end up in landfills or incinerated. Adopting international product design standards that distinguish between plastics by polymer type and chemical composition can maximize circularity and create economies of scale for the secondary plastics market as well as ensure that each type of plastic polymer is handled in the most resource-efficient and environmentally sustainable manner.

D. *Downstream Policy Measures*

1. Raising Capital for ESM Through Internationally Coordinated EPR Regulations

Extended Producer Responsibility (EPR) regulatory schemes shift responsibility to producers "for reducing environmental impacts of products throughout their whole lifespan, including the post-consumer end of life stage of the product's life."[197] Yet growing plastic waste exports and inadequate waste management capacity in developed and developing countries, highlight the inefficiency of EPR schemes that operate solely within national boundaries.[198] Current EPR schemes are

194. Birkbeck, *supra* note 25, at 25, 32.

195. *See The False Promise of Bioplastics and Compostable Plastics*, BEYOND PLASTICS, https://www.beyondplastics.org/fact-sheets/bad-news-about-bioplastics (last visited Oct. 8, 2024).

196. *See Grappling With the Infamous #7 PLA Recycling Code*, MCGILL, https://mcgillcompost.com/resources/grappling-with-the-infamous-7-pla-recycling-code (last visited Oct. 8, 2024). *See also* Lindsay Miles, *Plastic Recycling: What Those Numbers Actually Mean*, TREADING MY OWN PATH, https://treadingmyownpath.com/2013/06/26/plastic-recycling-what-those-numbers-actually-mean/ (last visited Oct. 8, 2024).

197. Birkbeck, *supra* note 25, at 29.

198. *Id.*

limited by companies claiming to have met their EPR responsibilities when waste is exported, or circumventing national EPR regulation by exporting goods to neighboring markets without such regulations.[199] Coordinating EPR regulation internationally can help address these issues by ensuring that companies are required to show that exported waste was recycled or managed in an environmentally sound manner.[200]

For example, companies producing single-use plastics that generate significant quantities of waste may be subjected to international EPR regulations that encourage eliminating unnecessary packaging to reduce costs of ESM. EPR may also incentivize designing products that are easily recyclable, free from toxic chemical additives, and use materials like polyethylene terephthalate (PETE) or high-density polyethylene (HDPE), which do not require advanced recycling equipment. Finally, producers of plastic waste considered "hazardous" under the Basel Convention may be charged higher fees under EPR regulation. Revenues raised from EPR schemes in developed countries can then be invested to support ESM of plastic waste including the expansion of recycling infrastructure in developing countries.[201]

IV. CONCLUSION

Achieving a circular plastics economy depends on a dramatic reduction in the production of plastics. Through the complementary implementation of MEAs, regional TAs, and unilateral action by governments, plastics production and consumption can be brought within sustainable levels to achieve an end to plastics pollution by 2040. However, this goal can only be accomplished if governments take immediate action and commit to robust, legally binding obligations at INC-5 and UNEA-7, which address the full lifecycle of plastics production, design, and disposal.

Ending plastics pollution requires decarbonizing the plastics sector and decoupling plastics production from the fossil fuel industry. Mandatory secondary plastics content requirements and economic incentives including tax credits for using renewable energy in production and recycling processes can reduce dependence on fossil fuels. Imposing taxes on primary plastics production will also serve to indirectly combat fossil fuel subsidies and directly create commercial incentives for secondary plastics. Complementary updates for a sufficiently granular HS code, and the adoption of international standards for

199. *Id.*

200. BIRKBECK, *supra* note 25, at 29.

201. *Id.*

plastics products design (promoting materials that are easily recyclable, high-value, and toxic-free) will support MEAs and TAs that promote circularity and enable efficient enforcement of legally binding measures at the level of domestic customs.

Clear trade policy measures promoting plastics circularity will also incentivize investment in expanding waste management capacity to adequately manage the entire range of plastics product types produced and the volume of plastics manufactured. Environmentally sound waste management and recycling that is safe for the humans processing plastic waste streams, safe for the environment, and safe for any subsequent use, can provide developing countries with economic opportunities and new jobs in the circular plastics economy while maintaining the integrity of human rights.

TRADE POLICY MEASURES TO PROMOTE PLASTICS CIRCULARITY

UPSTREAM	
Proposed Trade Policy Measure	**Goal**
Montreal Protocol "start-and-strengthen" approach	Phase out virgin plastics, decouple from fossil fuels
Categorize virgin plastics by polymer type as "controlled substances" and adopt restrictions on annual production/ consumption	Optimize phase out for plastics circularity by targeting hard to recycle plastics (thermosets), low-value plastics (single-use), and plastics containing "high concentrations of toxic chemicals for which alternatives are readily available"
Cross border licensing system; require license to produce, import, or export controlled substances	Monitor the flow of virgin plastics polymers and ban the unlicensed (and unregulated) production, import, and export of virgin plastics polymers
Stockholm Convention: expand POPs to include commonly used toxic additives	Phase out harmful chemicals that render plastics unsafe to recycle and support market-demand for toxic-free alternatives

MIDSTREAM	
Proposed Trade Policy Measure	**Goal**
Adapt Carbon Club model to impose a border adjustment tax through a differentiated tariff schedule	Reduce or eliminate the use of virgin single-use plastics, encourage trade in bioplastics and plastics alternatives, and economically incentivize trade in recycled plastics
Set strong product standards that require minimum recycled content via differentiated tariff schedule and preferential market access	Provide clear financial incentives to divest from the production of virgin plastics and to invest in the circular plastics economy
Differentiate "like" products based on sustainability of production through NPR PPMs and/or via government ROMPs requiring a minimum of twenty-five percent recycled content	Create market demand for secondary plastics; distinguish "like" products based on environmental and social considerations, including human rights
Update Harmonized Commodity Description and Coding System (HS) to include distinctions between plastics products by polymer type, chemical composition, and secondary plastics content	Provide preferential market access to products containing secondary plastics, easily recyclable plastics, or bioplastics
	Phase out plastics products containing toxic chemicals, single-use virgin plastics, thermosets, and other unrecyclable plastics
	"Fast-stream" customs mechanisms for high-value secondary plastics commodities, promote commercially viable recycling markets
Use tax revenues to invest in technical assistance, training, and capacity building of customs authorities and the WCO Green Customs Initiative	Enforce the regulation of primary plastics and toxic chemical additives commonly used in plastics

CONTINUED	
MIDSTREAM	
Proposed Trade Policy Measure	**Goal**
Set international standards for plastics product design similar to those in the EU Green Deal's Circular Economy Action Plan	Reduce unnecessary packaging, standardize packaging to maximize recyclability, reduce the need for virgin materials
	Enable adoption of MEAs, TAs, and domestic policy measures in compliance with the international standard (as defined by the TBT) to receive the benefit of a safe harbor
Codify voluntary and non-binding ISO standards as minimum environmental requirements embodied in national law	Provide governments with mandatory, legally binding plastics product design requirements within their respective markets

DOWNSTREAM	
Proposed Trade Policy Measure	**Goal**
Coordinate EPR regulation internationally	Require companies to document that exported waste was recycled or managed in an environmentally sound manner
Design EPR regulation to charge higher fees to producers of plastic waste considered "hazardous" under the Basel Convention	Incentivize plastics product design that is easily recyclable, free from toxic chemical additives, and use high-value materials like PETE or HDPE, which do not require advanced recycling equipment
Invest revenues from EPR schemes in developed nations to support ESM of plastic waste	Expand recycling infrastructure in developing nations to support ESM