Task Force 2
Climate Change, Sustainable Energy & Environment

Policy brief

PLASTICS IN A CIRCULAR CARBON ECONOMY

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Adam Bouloukos United Nations Development Program
Sara Lechtenberg-Kasten King Abdullah Petroleum Studies and Research Center (KAPSARC)
Michael Wang Argonne National Laboratory

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ABSTRACT

The G20 has made commitments to the international community to reduce plastic waste leakage into the natural environment. It should use its network and offices to galvanize the resources and technical expertise to meet commitments under the G20s Osaka Declaration. While previous G20 summits have focused on the problem, a significant amount of work is still to be done from a solution standpoint. This paper seeks to inform policymakers of the nature of the global plastic leakage problem and offer strategic solutions to reduce plastic pollution. We highlight the important role for plastics in the circular economy and identify the technology pathways for circular plastic economy and policies to encourage investment in recycling/upcycling infrastructure.

CHALLENGE

Plastics play a crucial role in our lives with continuing importance during the COVID-19 era. This commodity has been a critical component in personal protective equipment (PPE) as hospital-grade gloves, medical suits, masks, and COVID 19 test kits. However, concerns over personal protection have created additional plastic waste, with many of us carrying personal hand sanitizer dispensers made from plastic, wearing disposable plastic gloves and disposable masks. A conservative estimate indicates that 129 billion face masks and 65 billion plastic gloves are used and disposed of each month. (Aragaw 2021)

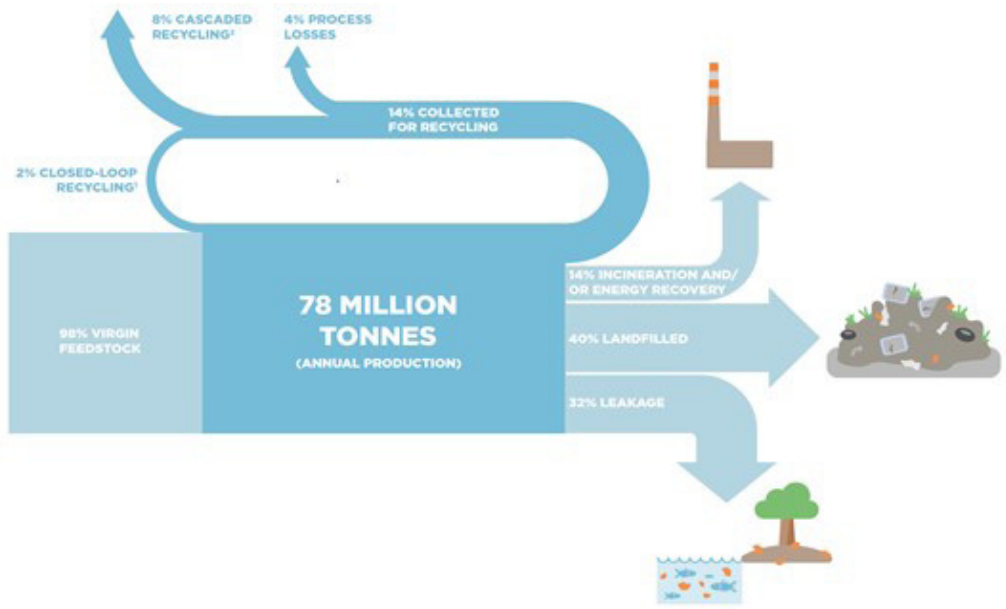
The pandemic has caused many changes to consumption patterns for Single-Use Plastics (SUPs). Out of an abundance of caution, many communities changed rules concerning the use of reusable bags and re-fillable bottle water, and have shut water fountains out of fear of spreading the virus. With many restaurants closed, SUP consumption and the use of plastic packaging have increased. While plastics products have helped keep us safe during this challenging era, we face the need to find ways to manage the waste and open opportunities to create circularity for plastics in our global economy. We hope that the darkest days of COVID-19 are behind us, and we must now address the management of the necessary waste that was a byproduct of this pandemic.

It is essential to recognize the role of plastics in our global economy, especially for G20 member states. The G20 countries represent the high producers of plastic waste, as seen in the table in Annex A. G20 economies benefit from producing plastic components and from the trade-in recycled plastic. The worldwide trade of scrap plastic was valued at US$5 billion in 2007 and grew to US$9 billion by 2017.

The G20 has recognized the challenge with plastic pollution and has called for member states to address marine plastic litter and microplastics. Osaka Blue Ocean Vision was adopted under the auspices of the Japanese G20 and speaks to the need for coordinated efforts to reduce the environmental harms of plastic waste and calls for a comprehensive lifecycle management approach to be implemented by 2050. In November 2020, at the G20 Summit hosted by the Kingdom of Saudi Arabia, the Leaders Declaration reinforced the role of the G20 and reaffirmed the commitment to the Osaka Blue Ocean Vision. The G20 is the appropriate venue to catalyze action, due in part to its role as plastics producers and consumers and its ability to share the burden with less developed countries to limit plastic leakage into the natural environment better.

PROPOSAL

While our forefathers used things until they were broken, worn out, or no longer functional, a modern mindset has shifted to consumerism and convenience. With the growth of economies and disposable income, many producers and consumers adopted a linear pattern "Make, Use, and Dispose". Consequently, the vast majority of plastics produced today come from new feedstocks, and only 2% of plastics are recycled and remain in the economy. The Ellen McArthur Foundation has worked on plastic waste management for more than ten years. The visual below from the Foundation captures the current state of plastic production and leakage.



Source: Ellen McArthur Foundation

The growing demand for plastic, together with just a small amount of plastic stays in the circular economy, elevates global plastic waste problems. The production of virgin plastic is growing at a rate of 5.4% a year, and 40% of plastic waste is from single-use items. Before the pandemic, the international community had made progress on addressing single-use plastic leakage into the environment, but G20 countries must recommit to solutions and targets under the Osaka Blue Ocean Vision.

The following are two priority messages for G20 consideration:

A. **Prevent Leakage:** G20 needs to reinforce policies that keep plastic in the circular economy and out of the natural environment. Preventing leakage means thinking of sustainability of consumption patterns, better product design, and embracing the need to keep plastics in a circular economy.

B. **Provide financial and technical assistance for recycling/upcycling infrastructure:** The G20 countries should work collaboratively with the developing world to enhance waste management and to develop recycling/upcycling infrastructure.

Circularity and Prevention: Plastic waste does not stay within the geographical boundaries of producer and consumer. We must re-think our relationship with plastic used just once and then tossed away. At present, 25% of the world lacks proper waste management or even simple segregation of plastics from other wastes. Plastic leakage into the environment is a symptom of unsustainable consumption patterns. The international community has recognized the role of SUPs in the larger waste management problem and has called for better design standards, labeling requirements, and alternatives to SUPs.

A part of prevention is on the shoulders of consumers to make better choices on the things they buy, but producers have a role in designing and labeling products. In many cases, consumers lack clear guidance on the impact of plastic. Improved labeling can help provide information on products that consumers can easily recycle and those containing "hard to recycle" plastics that may end up in a landfill, rather than staying in a circular economy. The truth is that many types of plastics are technically recyclable, but there is no domestic capacity to process the waste plastic or a viable market for recycled components. Producers must create an honest relationship with consumers concerning which plastics are readily recyclable and create a more innovative design to reduce and eventually eliminate "hard to recycle" plastics from production.

The private sector must continue to strive to find ways to reinforce a "cradle to cradle" (C2C) approach to products put into the marketplace. In many parts of the world, the consumer and the local government bear the cost of recycling or properly disposing of plastics. This paradigm is changing, with producers introducing incentives for consumers to recycle, and discussions on extended producer liability are becoming more frequent. The new corporate environmental, social and governance (ESG) requirements by investors will certainly create pressure and incentives for companies to further pursue plastic C2C approach. We call for industry to play a robust role in finding ways to ensure that the friction points between stakeholders in the circular economy include producers, consumers, governments, regulators, international organizations, advocacy groups, recyclers, and waste management officials. The era of shifting the burden of waste management to local officials is coming to an end, and creating the sharing of responsibility for plastic waste management is the reality.

Investment in Technology to Prevent Plastic Leakage: The basic plastic production technologies were developed at least half a century ago. Since then, incremental technology improvements have been on plastic performance and less on keeping plastics in the circular economy through upcycling or recycling. While the scientific focus on performance helped the industry create the plastics used in consumer goods, a new shift is underway to determine new technologies for recycling/upcycling, including options for increased reliance on bioplastics.

Today, plastic recycling is based mainly on the mechanical recycling process with cleaning, sorting, and reducing waste plastic polymers to polymers for reuse. However, several factors limit the efficiency of the mechanical recycling process. First, when plastic goes through the mechanical recycling process, there are issues related to quality, contamination, and an inflexible system concerning plastic type for recycling. For example, SUPs cannot be mechanically recycled. Similar limitations with recycling PVC exist due to its high chlorine content (about 56% wt.). Thus PVC must be separated from other plastics before the mechanical recycling process is initiated. These are just a few of the technical obstacles to creating circularity for plastics.

It is essential to recognize that at a certain point, plastics will degrade and can't be recycled into the same high-quality component used for medical, food/beverage containers, or other plastics that need to be highly sanitary. This is especially true for mechanical recycling. Ultimately, when a plastic component is at the end of useful life, it is possible to lift back to virgin plastic via chemical upcycling, through which polymers are reduced to monomers for reproducing polymers, or to enter into the circular economy of construction applications or in waste-to-fuel or waste-to-energy applications. One downside of chemical recycling is that it is more expensive than mechanical Recycling (Williard 2019). There exist several technologies for chemical recycling. Pyrolysis is a process that can make oil from waste plastic, which can then be used to produce fuels or polymers, thus keeping the components in the circular economy.

While chemical recycling, appears to be one promising solution in the suite of options, supply chain logistic challenges and economic hurdles must be solved. Disposal and collection of waste plastic, together with other recyclable materials (such as aluminum cans), have always faced logistic challenges. Many countries use single-stream recycling, which allows the consumer to dispose of all recyclable materials into one bin in the hopes of increasing collection rates and to reduce transportation costs. The mixed recyclable materials are sorted in materials recovery facilities (MRFs). Technologies are being developed for MRFs so that most of the sorting in MRFs can be done by machine instead of manual labor.

One major hurdle of plastic recycling/upcycling is economics associated with recycling/upcycling as compared to virgin plastic. With the current historical low prices of natural gas and petroleum, it costs less to produce virgin plastic than recycled/upcycled plastic. We call for an increase in Research and Development to find ways to lower the cost of waste plastic logistic and recycling/upcycling technologies. Policymakers need to provide economic and societal incentives to invest in better recycling approaches and create efficiencies to keep plastic in the circular economy. From the operating side, chemical recycling technologies are energy-intensive, requiring process optimization to reduce energy demand. From techno-economic analyses, energy costs represent one of the most significant production costs for the process. Therefore, energy cost and oil prices play an important role in determining chemical recycling profitability.

Investment in waste management infrastructure in Least Developed Countries: Recycling alone, whether through mechanical or chemical approaches, will not solve the current plastic waste challenge. Still, immediate investment in waste management infrastructure, especially in the developing world, can help reduce leakage. G20 countries producing and consuming plastics must bear the burden of managing that waste sustainably and stop shifting plastic waste management to Least Developed Countries. We call for international support for both waste infrastructure investment globally and financial support for plastic waste clean-up initiatives in counties in the developing world.

We also recognize efforts to regulate plastic waste through the Basel Convention and that agreement's role in reducing plastic leakage into the natural environment. Signatories to Basel are required to trade in clean, sorted, and easy to recycle plastics while discouraging plastics that are difficult to recycle. This legal agreement seeks to create binding measures to create greater transparency and regulation of plastic waste. However, it does not per se address the more significant circularity issues and investment in waste management infrastructure.

With support from public and private sectors, R&D will make great strides in countries hoping to make a significant impact with new strategies in plastic waste management. Numerous countries support R&D through direct means, like grants and loans, or indirect means, like tax incentives. For example, the Italian government encouraged innovation in green chemistry, encouraged biodegradable materials and focused citizens and businesses on ways to address plastic waste. With governments taking financial responsibility for R&D by collaborating within their states' public and private spheres, the certainty of advancements in the R&D sector will be unavoidable.

Another proposed area for investment is for public information campaigns to help consumers have more information on recycling, responsible consumerism, and the ramifications of long-term impacts of plastic leakage into the environment. At present, a consumer who opts for SUPs does not suffer any negative consequences for their convenience choice. Without public information on what can be recycled, how to reduce consumption of "hard to recycle" components, and good environmental stewardship, the international community will fall short of the 2025 goals.

Conclusion: While plastic is a durable, inexpensive, and widely used commodity, many countries worldwide focus more on the challenges associated with waste management and leakage into the environment. G20 countries have benefitted from the production of plastic products, and these goods have made many lives better and safer. Meanwhile, our consumption patterns, combined with a lack of strategic thinking about waste management, are not sustainable. The pandemic has distracted the international community from the critical need to reduce plastic leakage into the environment. The G20 should recommit to addressing the challenges of reducing single-use plastic leakage, improving plastic waste management, and aiding least developed countries to build their waste management capacity.

APPENDIX

PLASTIC WASTE BY G20 COUNTRIES

G20 COUNTRY	PLASTIC WASTE PRODUCED IN THOUSAND TONS A YEAR
CHINA	59,080
UNITED STATES	37,826
GERMANY	14,477
BRAZIL	11,852
JAPAN	7,993
RUSSIA	5,840
TURKEY	5,597
INDONESIA	5,046
THE UNITED KINGDOM	4,926
SPAIN	4,709
FRANCE	4,557
INDIA	4,493
SOUTH AFRICA	4,466
MEXICO	3,725
ITALY	2,899
ARGENTINA	2,754
SOUTH KOREA	2,026
SAUDI ARABIA	1,562
CANADA	1,154
AUSTRALIA	901

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ABOUT THE AUTHORS

Adam Bouloukos United Nations Development Program, Riyadh (Saudi Arabia)

Criminologist and development professional who is now serving as the Resident Representative of the United Nations Development Programme in Saudi Arabia. He has worked in the United Nations for 25 years in complex humanitarian and development contexts in Afghanistan, Pakistan, Sudan, Ethiopia and Uganda.

Sara Lechtenberg-Kasten King Abdullah Petroleum Studies and Research Center, Riyadh (Saudi Arabia)

Research Fellow at the King Abdullah Petroleum Studies and Research Center. She is an attorney and works on resiliency and environmental issues, based in Riyadh, Saudi Arabia

Michael Wang Argonne National Laboratory, Lemont (USA)

Distinguished Fellow and Director of the Systems Assessment Center, Energy Systems Division at Argonne National Laboratory. He and his Center have been examining energy, environmental, and economic performance of technologies for sustainable development including using of waste plastic for producing energy and products. He has over 300 publications in the areas of transportation energy and environment effects. He was named recently in Reuters' "Hot List" of the most influential climate scientists in the world.