

Fighting Ocean Plastic Pollution

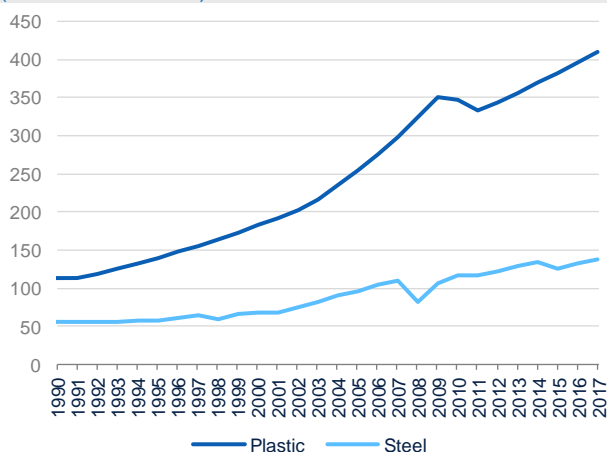
Bringing opportunities in the circular economy

Marcial Nava

A crisis of planetary proportions

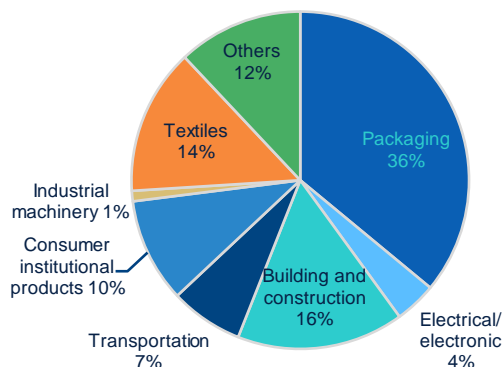
Plastics are one of the most successful inventions of modern times due to a combination of attributes that are difficult to find in other materials: high resistance to corrosion, high strength relative to weight, high durability, low electrical and thermal conductivity, low toxicity, low cost, and visual aesthetics. As a result, these synthetic organic polymers have countless applications in packaging, construction, transportation, machinery, textiles and, electrical and electronic products, among others. The world has produced about 8.3 billion metric tons of virgin plastics since 1950¹, implying an 8.6% compounded annual growth rate, which is more than twice the world's GDP average growth. In 2017, global production of plastics was close to 410 million metric tons, equivalent to more than a billion kilograms or 2.5 billion pounds per day.² By contrast, global production of steel was 138 million metric tons in the same year.

Chart 1. Global plastic and steel production (Million metric tons)



Source: Bloomberg, and BBVA Research based on Geyer, Jambeck, and Law (2017)

Chart 2. Global plastic production by industrial sector in 2015 (%)

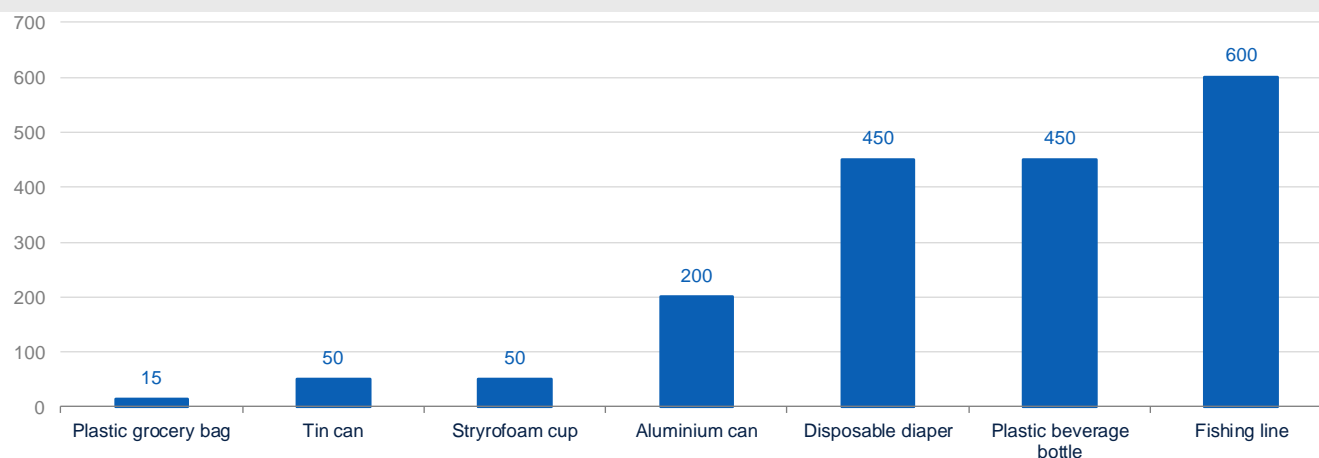


Source: UN Environment (2018) with data from Geyer, Jambeck, and Law (2017)

However, as it is well known, “there is no such thing as a free lunch” and our increasing reliance on plastics has come at a high price. Plastics do not degrade naturally. In addition, from the nearly 6.3 billion metric tons of plastic waste generated by humans as of 2015, only 9% was recycled and 12% was incinerated. The remaining 79% was deposited in landfills or the natural environment. If these trends continue and there is no significant change in the consumption of plastics and the management of plastic waste, there would be nearly 12 billion metric tons of plastics garbage by 2050.³

1: R. Geyer, J.R. Jambeck and K. L. Law (2017). “Production, use and fate of all plastics ever made.” Science Advances, Vol. 3, no. 7, e1700782. [Google Scholar](#)
 2: Plastic production in 2017 and CAGR were estimated by BBVA Research using information from Geyer, Jambeck, and Law (2017) *Op. cit.* World’s GDP figures were obtained from the St. Louis Fed’s FRED portal. <https://fred.stlouisfed.org/>
 3: Geyer, Jambeck, and Law (2017), *Op. Cit.*

Chart 3. Estimated time taken to decompose*
(by type of debris, years)



Source: NOAA / Woods Hole Sea Grant. *Time it takes for these items to become microscopic and invisible.

An ocean of plastic

When improperly disposed, plastics can cause great damage to the planet's ecosystems, and the ocean in particular. Approximately 8 million metric tons of plastic are dumped into the ocean every year. This is equivalent to the full load of a garbage truck every minute.⁴ Images of fish, turtles and marine mammals trapped and suffocated by abandoned fishing nets, beaches completely covered by plastic debris, or pictures of seabirds and whales killed by the accumulation of pieces of plastic in their gastrointestinal track have outraged the public. The discovery of massive amounts of plastic waste concentrated by ocean gyres like the Great Pacific Garbage Patch, which has an estimated area of 1.6 million square kilometers, twice the size of Texas and three times the size of France, illustrates the colossal scale of the problem.⁵

Cleaning the ocean of plastics is extremely difficult if not impossible. There is evidence of plastic contamination in the surface, the seafloor, the coasts and even the arctic ice. Plastic waste has a multiplying effect. This is because, although they don't biodegrade, plastics are slowly fragmented by the combined effect of sunlight and water. This process ends up in large amounts of tiny (less than 5 mm long), often microscopic (less than 100 nanometers), bits of plastic that aquatic organisms confuse with food. Once incorporated into the food chain, plastics ultimately reach the human body through the consumption of seafood. Micro-plastics are not only produced by natural fragmentation. Microbeads (a manufactured version of micro-plastics) are used in marine, boat, road and building paints, as well as cosmetics and personal care products including toothpaste, which make their way into water systems every time they are rinsed out. Once in the water, micro-plastics are virtually impossible to remove. Presence of micro-plastics has been identified in some of the most common commercial species for fisheries and aquaculture.⁶ Plastics and fibrous material has also been found in the guts of fish across markets in California and Indonesia.⁷

4: R. Geyer, J.R. Jambeck, K.L. Law, *et. al.* (2015). "Plastic Waste Inputs from Land into the Ocean." *Science Advances*. Vol. 347. Issue 6223, pp. 768-771. [Google Scholar](#).

5: The Ocean Cleanup. "What is the Great Pacific Garbage Patch?" <https://goo.gl/qzPxRz>

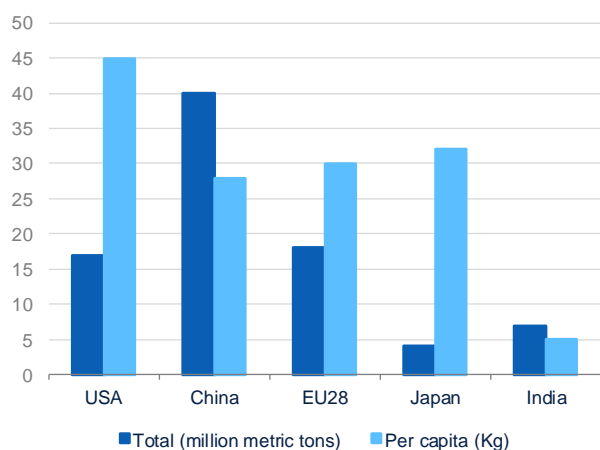
6: A.L. Lusher, P.C.H. Hollman, and J.J. Mendoza-Hill (2017). "Micro plastics in fisheries and aquaculture: status of knowledge on their occurrence and implications for aquatic organisms and food safety." *FAO Fisheries and Aquaculture Technical Paper*. No. 615. [Google Scholar](#)

7: C.M. Rochman, A. Tahir, S.L. Williams, *et. al.* (2015). "Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption." *Scientific Reports* 5, Article number: 14340. [Google Scholar](#)

Although the effects of micro-plastics on human health are still not fully understood, the experience with asbestos and its deadly consequences proves that “no evidence of harm” does not imply “evidence of no harm.” The United Nations (UN) has acknowledged that, “the presence of micro-plastics in foodstuffs could potentially increase direct exposure of plastic-associated chemicals to humans and may present an attributable risk to human health.”⁸

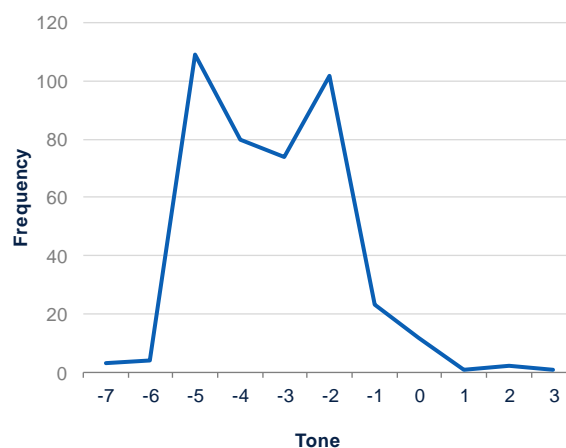
The problem of plastic pollution has been aggravated by the development, commercialization, and irresponsible consumption of single-use plastic objects that are primarily used for packaging (e.g. water bottles, grocery bags, food containers, coffee pods, lids, cutlery, etc.) These products have a very short usable life span, usually of a few minutes. Plastic packaging accounts for 50% of global plastics waste. By country, China is the largest generator of plastic packaging waste in absolute terms, but the U.S. is the largest generator of plastic packaging waste per-capita.⁹ Among some of the items most commonly found on beaches are cigarette butts, plastic bottles and caps, food wrappers, grocery and other types of plastic bags, plastic lids, straws and stirrers, glass bottles, as well as Styrofoam take-away containers.¹⁰

Chart 4. Plastic packaging waste generation (2014)



Source: UN Environment (2018) adapted from Geyer, Jambeck, and Law (2017)

Chart 5. Plastics pollution news tone (>0 positive; <0 negative)



Source: GDELT TV Explorer

It has been estimated that by 2050, there could be as many pieces of plastic as fish in the ocean and 99% of all seabirds will be ingesting plastic.¹¹ According to the UN, the economic damage inflicted by plastic pollution on the world’s marine ecosystem could be at least \$13 billion.¹² The crisis is so evident that in 2015, the U.S. Congress amended the Federal Food, Drug and Cosmetic Act (FD&C Act) by passing the Microbead-Free Waters Act of 2015, which prohibits the manufacturing, packaging, and distribution of rinse-off cosmetics containing plastic microbeads. In 2017, the UN declared “war on ocean plastic” and initiated a global campaign to eliminate “sources of marine littering, micro-plastics in cosmetics, and excessive and wasteful usage of single-used plastics by 2022.” In 2018, the European Union (EU) issued the first Europe-wide strategy on plastics aimed at recycling all plastic packaging on the EU market by 2030, reducing the consumption of disposable plastics and limiting the use of micro-plastics.¹³

8: United Nations Environment Program (2017). “Frontiers 2017. Emerging Issues of Environmental Concern.” <https://goo.gl/bgUW9d>

9: United Nations Environment Program (2018). “Single Use Plastics: A Roadmap for Sustainability.” [Google Scholar](https://www.google.com/scholar)

10: *Ibid.*

11: *Ibid.*

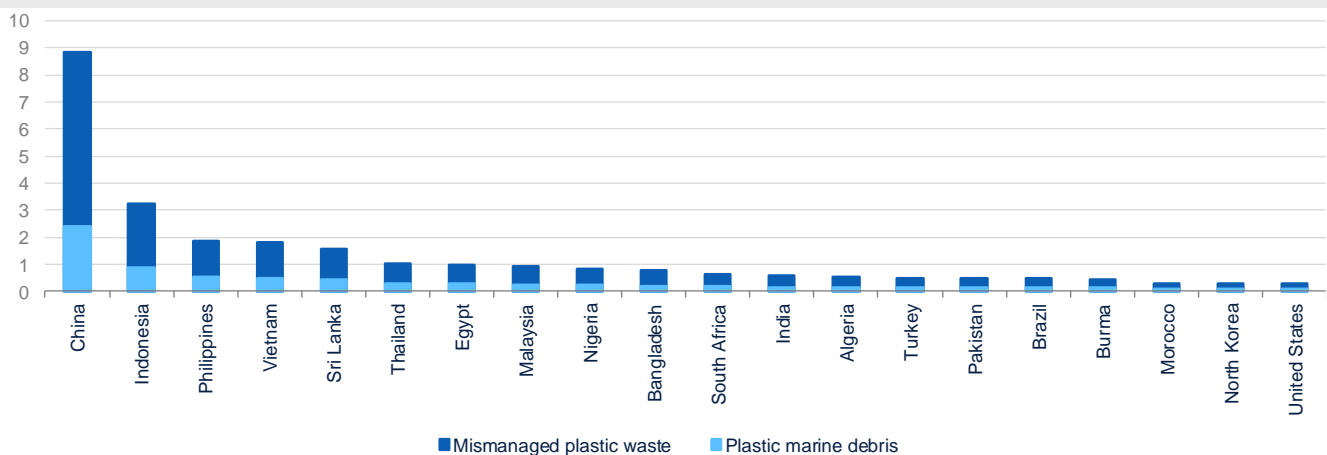
12: *Ibid.*

13: European Commission. (2018). “Plastic Waste: a European strategy to protect the planet, defend our citizens and empower our industries.” Press release.

<https://goo.gl/4TJTn3>

Sixteen out of the biggest producers of plastic waste are middle-income countries that lack the necessary waste management infrastructure to deal with rapid income and population growth. China, Indonesia, Philippines, and Vietnam are responsible for half of the mismanaged plastic waste generated in the world.¹⁴ It has been estimated that approximately 90% of the plastics that reach the ocean every year come from rivers that cross developing countries. Eight of them are in Asia: the Yangtze (China); Indus (China, India and Pakistan); Yellow (China); Haihe (China); Ganges (India and Bangladesh); Pearl (China and Vietnam); Amur (Russia and China); Mekong (China, Myanmar, Laos, Thailand, Cambodia, Vietnam); and two in Africa – the Nile (Egypt, Sudan, South Sudan, Ethiopia, Uganda, Congo, Kenya, Tanzania, Rwanda, Burundi, Eritrea) and the Niger (Guinea, Mali, Niger, Benin, Nigeria).¹⁵

Chart 6. Plastic waste mismanaged and plastic marine debris (Million metric tons per year)



Source: BBVA Research adapted from Geyer, Jambeck, and Law (2017)

Preventing plastics from reaching the ocean

Investments, agreements and policy instruments

There are 8 major actions identified by the UN to stop ocean’s plastic pollution: prevention, minimization, reuse, recycling, other recovery, landfill, controlled deposits and uncontrolled deposits. These measures have different degrees of efficacy. Prevention has the largest positive impact while uncontrolled deposit is the least desirable. Therefore, measures to stop plastic pollution should be aimed at stopping plastics from reaching the ocean in first place. This can be best achieved by investing in waste management infrastructure, especially in countries that generate most of the waste. The impact of these investments can be substantial given that nearly two billion people in the planet live without waste collection at all, and 3 billion people live with some form of uncontrolled waste disposal. Depending on each country’s specific needs and circumstances, investments can be made to improve collection services, close leakage points, and build gasification, incineration or recycling facilities.

Investments in waste management infrastructure can be complemented by voluntary reduction strategies and agreements that involve consumers, private businesses and governments. Some global corporations have received attention for their voluntary reduction strategies. For instance, in 2017, Adidas AG sold more than a million shoes made out of ocean plastic. Each pair of shoes prevents the equivalent of roughly 11 plastic bottles from entering the ocean, the company claimed.¹⁶ Meanwhile, early in the year, Coca-Cola announced its goal to 100%

14: Geyer, Jambeck, and Law (2015) *Op. cit.*

15: Karen, Graham (2018). “90 percent of plastics polluting our oceans come from 10 rivers.” Digital Journal. Last modified June 8, 2018. <https://goo.gl/wjCqe9>

16: Arjun Kharpal (2017). “Adidas sold 1 million shoes made out of ocean plastic in 2017.” CNBC. Last modified March 14, 2018. <https://goo.gl/Ks9uzy>

recycling of the bottles and cans it sells by 2030.¹⁷ In addition, Ikea announced it would eliminate single-use drinking straws and shopping bags by 2020 while SeaWorld and Royal Caribbean agreed to phase out specific plastic products from their properties.¹⁸

In addition to voluntary agreements, policy instruments could also limit the production and consumption of plastics. There are about 66 countries that use public policy to prevent plastic pollution. Some of these policies are regulatory in nature (e.g. total or partial bans), while others take the form of economic incentives (e.g. taxes and fees on producers, sellers or consumers). At the national level, total or partial bans on plastic bags and other single-used items are more common in developing countries. According to the UN, there are 25 countries in Africa that have established different types of bans for single-used plastics, in some cases with very severe penalties. However, little is known about the effectiveness of these measures since most of them are very recent and limited by poor enforcement.

Economic incentives are more frequent in developed countries, particularly in Europe where levies have been applied directly to consumers, distributors, or producers with relative success. In the U.S., bans and levies on single-used plastics are primarily used by local authorities (e.g. New York's ban on single-use Styrofoam). However, very often, these measures tend to be challenged in courts by state authorities and interest groups. Meanwhile, it is still uncertain how the U.S. federal government will deal with ocean plastic pollution. For instance, in August 2017, the Trump administration reversed a 2011 ban on the sale of plastic water bottles in some of the most famous national parks in the country. Recently, the U.S. did not endorse the G7 Ocean Plastics Charter that sets objectives toward 100% reusable or recoverable plastics by 2030 and 100% recycling of plastic packaging by 2040. Notwithstanding U.S. policies, in the following years, the number of countries adopting measures to reduce oceans' plastic pollution is projected to increase.

Public pressure can also serve as an effective mechanism to induce action from government and other organizations. In addition to visual evidence, campaigns also spread out quickly over the internet, especially among the young. Across the world, young people are organizing to demand action against plastic pollution in their communities. One notable example is the initiative "[Bye Bye Plastic Bags](#)" created by the teenagers Isabel and Melati Wijzen who successfully managed to convince authorities in Bali to ban plastic bags. Today, the initiative has become a global organization that promotes the use of reusable bags, mobilizes volunteers to conduct beach cleanups, and recognize plastic-bags-free businesses on social media.

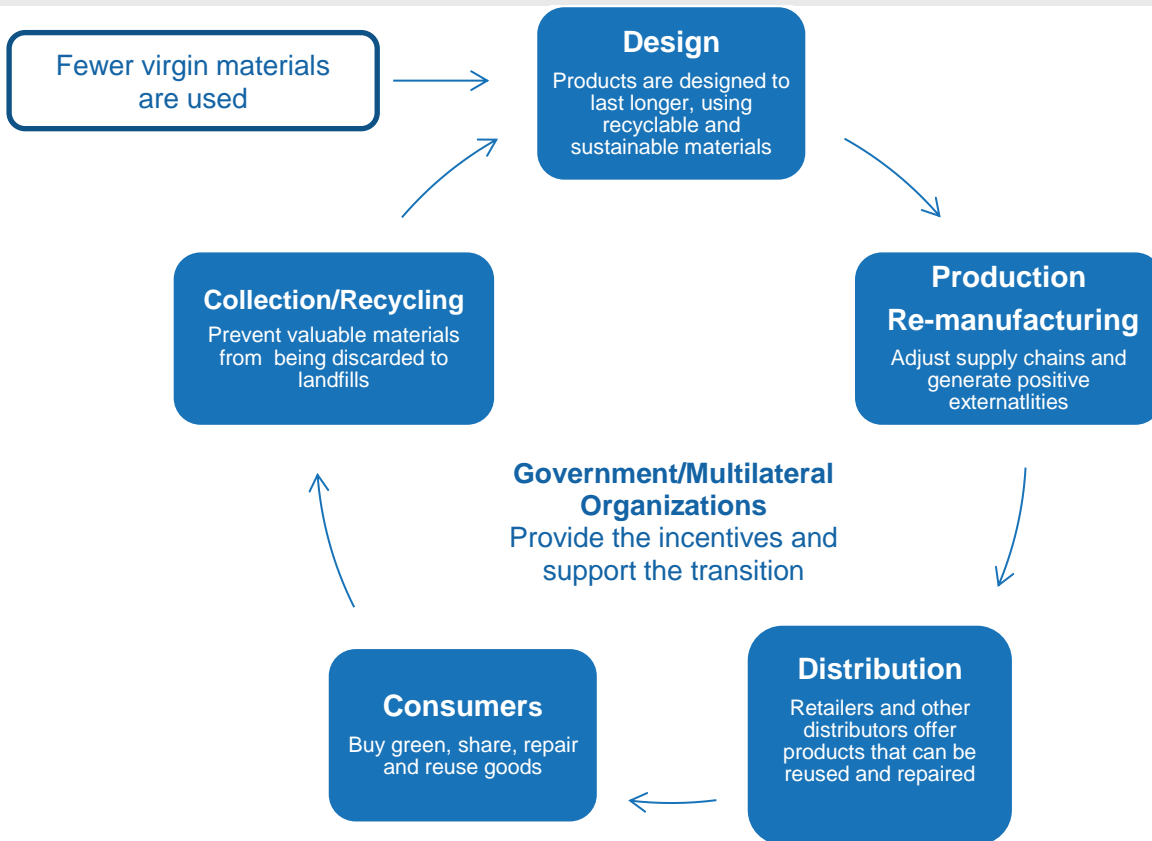
The circular economy

A long-term solution to ocean plastic pollution requires breaking up with the way we produce, consume and dispose plastics. The current "take, make, dispose" model should be replaced by one in which plastics never become waste. This could be achieved by embracing the principles of the "circular economy." It all starts with design. In the circular economy, products are designed to last longer, using sustainable materials (e.g. bioplastics) that are easy to recover once the product can no longer be used. Businesses commit to embrace these types of products as a way not only to reduce plastic pollution but also to cut their carbon emissions and reduce their dependency on fossil fuels.

Retailers and other distributors commit to offer products that can be repaired and reused, while consumers do their part by buying, sharing, repairing and reusing these products. Governments provide the incentives and support so that businesses and individuals can embrace the circular economy without being severely disrupted. These efforts required efficient waste management systems that help recovering and retaining the materials in the production-consumption cycle. Advocates of the circular economy claim that its implementation results in higher productivity since nothing is wasted.

17: Jay Moyer (2018). "A World Without Waste: Coca-Cola Announces Ambitious Sustainable Packaging Goal." Last modified Jan19, 2018. <https://goo.gl/ANbGiM>
18: Darryl Fears (2018). "Sea World, Ikea and Royal Caribbean are getting rid of plastic straws and bags." The Washington Post. Last modified June11, 2018. <https://goo.gl/H5uhqZ>

Chart 7. The Circular Economy



Source: BBVA Research based on UN Environment (2018)

In practice, companies like Dell, Levi Strauss, Timberland and Energizer have successfully incorporated “circular models” to their supply chains¹⁹. As similar stories accumulate and pressure from stakeholders increases, more corporations are expected to embrace the circular economy in the following years. In the long-run, if the “circular economy” becomes the new norm, we could end up having a new and potentially more efficient and sustainable economic system.

The circular economy has turned into fertile ground for innovation and entrepreneurship that combine sustainability, economics, and in some cases a good dose of technology. The [Plastic Bank](#), for example, allows people to exchange plastic bottles for cash or digital tokens that can be used to buy goods, or pay for basic services. This model serves two purposes: on the one hand, it prevents plastic pollution by assigning economic value to used plastics; while on the other hand, it contributes to alleviate poverty by allowing people in poor countries to gain some extra revenue. The collected bottles are processed and sold to corporate partners. Individuals can also commit to pay for the collected plastic bottles and neutralize their own consumption. The organization calls this model “Social Plastic”. It has been already implemented in Haiti and there are plans to expand it to other countries in the near future. The impact of organizations like Plastic Bank could be significant given that between 15 and 20 million people work in informal recycling around the world.

19: Mike Hower (2016). “8 Companies to Watch in the Circular Economy.” Last modified August 10, 2016. <https://goo.gl/9j7M15>.

Another example is the Chilean company [Algramo](#), which sells grains (rice, beans, lentils, corn) and other staples in reusable containers, allowing buyers (most of them in poor areas) to save money and reduce the amount of waste from disposable packaging. The company pioneered the use of automated dispensers located in convenience stores. Algramo has been praised by numerous international organizations and has received petitions to operate in other developing countries.

Efforts to bring multiple stakeholders to come up with coordinated action have intensified and are coming not only from countries and multilateral organizations, but from businesses and the non-for-profit sector as well. For example, the [New Plastics Economy](#) is bringing together businesses, philanthropists academics, governments, NGOs, students and citizens to create a new model for plastics based on the circular economy principles. Thanks to its work, leading brands such as PepsiCo, L'Oréal, Mars and Unilever are working towards 100% reusable, recyclable or compostable packaging by 2025 or earlier.²⁰ The New Plastics Economy operates under the idea that coordinated action would yield faster and more effective results than multiple but fragmented initiatives.

Research and development is critical to the success of a circular system for plastics. For instance, a team from the [University of Pittsburgh](#) used nanotechnology to create a single recyclable material to replace packaging made out of layers of various components that are difficult to recover. California's company [Full Cycle Bioplastics](#) developed a bio-plastic that feeds from organic waste and degrades in the ocean. In Indonesia –one of the largest producers of ocean plastic waste- [Evoware](#) manufactures packaging products such as coffee sachets, food wraps and soap packaging using seaweeds.

For banks, plastics could be more than credit cards

The financial industry could be a major stakeholder in the fight against ocean plastic pollution. In the following years, the building of waste management infrastructure, recycling plants, the emergence of new companies in the circular economy and the redesigning of existing supply chains would require access to public and private capital. Banks could serve as effective intermediaries between these projects and investors, particularly those interested in making a positive impact through value-based investments. On the retail front, banks could effectively accelerate the transition to a “circular economy”. As long as branches remain in existence, banks could focus on transforming into “green spaces” with high proportion of recyclable and biodegradable furniture and equipment. Banks contribution could be even more significant by accelerating the digitization of products and processes and by rewarding “green” consumption via credit cards. A credit card made out of bio-plastics could be a powerful marketing tool to attract environmentally conscious clients, especially the young. Microfinance entities could facilitate the collection and sale of plastic bottles in poor countries, helping people to generate extra revenue and improve their wellbeing.

Financial institutions should also be aware of the risks entailed by government, companies and individuals embracing circular models. For instance, special taxes or stricter regulations on plastics used in packaging could not only incentivize the search for alternative materials, but also increase costs for producers if the alternatives are not competitive enough. Higher production costs could be transferred to consumers, affecting demand.

Another risk is that the production of virgin plastics could peak as a result of more recycling and alternative materials. This could have significant implications for certain industries such as oil and gas extraction and petrochemical manufacturing. The risks seem to be contained as production of virgin plastics is likely to continue growing supported by population and income growth. However, as a new market based on circular economy principles expands and consolidates, the demand for virgin plastics could slow down. From a macroeconomic perspective, U.S. exports could be negatively affected as the rest of the world transitions to a circular economy.

20: New Plastics Economy (2018). “Companies take major step towards a New Plastics Economy.” Last modified January 22, 2018. <https://goo.gl/9hWFoj>

Summing-up

The littering of plastics into the ocean has become a problem of planetary proportions. It is a serious threat to the life of numerous species and the wellbeing of billions of people that depend on the ocean to survive. The crisis is pressing, and in the absence of meaningful actions, the impact could soon be irreversible. Eliminating ocean plastic pollution would require large-scale coordinated action from individuals, businesses, governments, and multilateral organizations.

“Turning off the tap” of plastics should be the first step. This can be done by improving waste management infrastructure in countries that generate most of the plastic waste that ends up in the sea. The best infrastructure projects will be those that accommodate to each country’s conditions and take into consideration the needs of millions of people that work in informal waste collection. Yet, waste management infrastructure *per se* is not a permanent solution since population and income growth guarantees a higher demand for plastics. This is where the circular economy can help create a system in which plastics are never wasted.

Finally, efforts to eradicate plastic pollution will trigger innovation in different areas such as product design, packaging, alternative materials, recycling, and energy recovery, among others. In a best case scenario, new business models and companies will emerge, creating a virtuous cycle between sustainability and employment growth. For banks, understanding the changes entailed by the fight against ocean plastic pollution is a first step to become key stakeholders in the circular economy.

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