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Global Organization for PHA

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Preventing Plastics Pollution with PHA in "The Circular Economy"

Part 1: Plastics Pollution – How big is The Challenge?

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Plastics pollution in numbers

Plastics are ubiquitous in our daily lives. Their durability, transparency, flexibility, lightweight nature, and ease of processing have made them one of the highest volume materials that we produce and use today. The benefits of conventional plastics, specially their ease of use and processing have contributed to its end of life issues, that we experience today. Geyer, Jambeck and Law concluded that between 1950 and 2015, 8.3 billion tons of polymers of all kinds were produced of which 6.3 billion tons (79%) have been discarded in landfills or in our environment.[1] 750 million tons or 9% have been recycled and 1 billion tons or 12 % have been incinerated. They estimated that in 2015 approximately 274 million tons of plastics entered landfills and our environment and by 2050 we would accumulate 12 billion tons of plastics in our landfills and in the environment. Additionally, a major report on plastics conducted by the Ellen MacArthur Foundation concluded that in 2013 about 34% (26.5 million tons) out of 78 million tons of plastics used in packaging leaked into the environment.[2]

Macro vs. micro-pollution

These numbers paint a grim picture but belie another pressing and urgent problem with plastics pollution: microplastics.[3,4,5] Microplastics are particles of plastics that are less than 5 millimeters in size and can be as small as a few nanometers. [6] Primary microplastics stem from washing synthetic fiber-based clothes; from wear and tear of footwear, automotive and transportation tires; from plastics beads used in cosmetics; from paints, coatings and adhesives, that chip away over time; from packaging and agricultural films and fertilizer coatings, and that are less than 5 mm when entering the environment. Secondary microplastics are generated mainly from fragmentation of discarded plastics items like bottles, fishing nets, packaging and bags. Eventually they all end up in the marine environment through runoff water.

Major studies undertaken by the scientific community since 1971 and more recently by the United Nations, point to microplastics accumulation as a major issue directly affecting our food chain.[7] These tiny plastics particles are being ingested by marine life which point to contamination of our food. One scientific study looked into the effects of microplastics in Daphnia Magna, a tiny crustacean growing throughout the Northern Hemisphere and in South Africa.[8] These crustaceans are a popular food for both small fishes and large marine mammals. The study concluded that the microplastics being ingested by these crustaceans are reducing their reproductive capacity, thereby reducing their population significantly within two

generations.[8] This and other UN studies concluded that such significant reduction in marine food is also reducing the fish population that humans and other larger marine animals depend on, thereby seriously depleting our already over-fished oceans.[9] Additionally, microplastics ingestion can cause toxins to accumulate in the human body. The UN study concluded that the true extent of the microplastics threat is not yet evident, but the potential for an epidemic exists.

Plastics pollution in the circular economy

The Circular Economy prioritizes reducing, reusing and recycling. While these paradigms are essential, the effort and the infrastructure development initiatives, especially in countries where plastic pollution has already reached epidemic proportions, may be too little too late. Global remedial actions will take time to yield results and natural systems need decades to restore. There is evidence of such timelines when we look at the fluorocarbon related ozone layer depletion issue. The positive side of that potential catastrophe was that when we as a world decide to take action, we can be successful.

Plastics pollution including microplastics remediation requires a wide variety of large-scale solutions and initiatives, now. Therefore, circular economy programs must seriously embrace and encourage the increased use of natural materials that would biodegrade, disappear and close the loop naturally.

Closing the loop naturally with PHA

PHA or PolyHydroxyalkanoate is a versatile class of natural material, which are renewable, biodegradable in soil, fresh water & marine environment, and home compostable. Their properties can be tailored to numerous target applications. Thereby, PHA can prevent plastics pollution, including primary and secondary microplastics pollution. •

References:

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Global Organization for PHA

The Global Organization for PHA is a member-driven, non-profit initiative to accelerate the development of the PHA-platform industry. Polyhydroxyalkanoate polymers (PHAs) provide a unique opportunity as a solution for reducing greenhouse gases and environmental plastics pollution, and establishing a circular economy, by offering a range of sustainable, high-quality and natural products and materials based on renewable feedstocks and offering diverse end-of-life options.

GO!PHA provides a platform for creating and sharing experiences and knowledge and to facilitate joint development initiatives.

Become a member or sponsor to start sharing, contributing and collaborating to accelerate the PHA-platform industry.

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