

Feedback on Management framework for plastic

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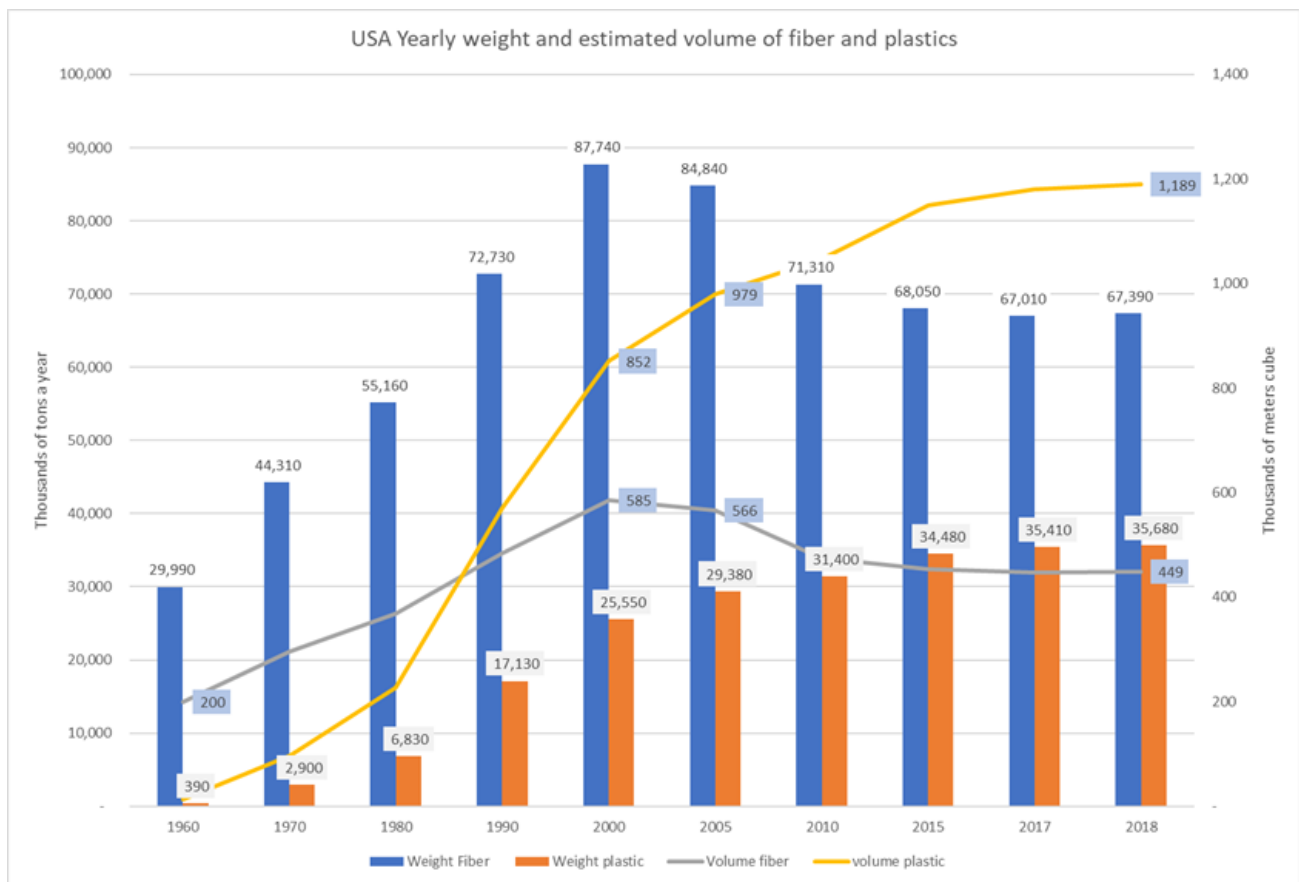
We have attended the webinars and liked the discussions. There are 3 points that we believe should be taken into consideration: i) the propose ban of the six plastic products is an incomplete solution to the real problem of litter both on the ground and in the ocean, ii) there is little mention of the disposal of plastics that are not recycled, and iii) all recycling proposals seem to provide markets only if plastic is recycled as plastics or mixed with other plastics.

The proposed ban is on six products that have similar characteristics: each unit has little value (below 10 cents per unit) and they weight little (less than 8g). In most cases, they have replaced other disposables usually paper or wood because of lower costs. For example, a plastic grocery bag weighs 6 to 8 grams and costs 1 cent to produce while a paper bag cost 4 or 5 cents and weights 55 grams. Because of their low value, there is a strong propensity to discard them, but this is also true of Covid masks, candy wrappers, toothpicks, small packaging etc... Banning them will not resolve the litter problem and might have the reverse effect by reducing the need to put the infrastructure needed to police litter and provide adequate disposal system at the end of life of plastics. I still remember looking at the highways in the 1950s and 1960s when litter was prevalent. The Keep America Beautiful program (<https://www.motherjones.com/politics/2006/05/origins-anti-litter-campaigns/>) solved a lot of the problem but, because of growing population and the persistence of plastics, it is important that the government enforces strong regulations for producers, importers and individuals. It should also encourage cleanup operations. In regard to marine plastic pollution, a lot has to be done in strong collaboration with the fishing industry and it must be a global initiative, as most of the plastic pollution comes from discarded nets and countries where waste management infrastructure is weak. Countries, such as Ireland, that banned plastic bags from checkout counters, found no appreciable reduction of plastic bags in their landfills: people simply bought plastic garbage bags instead of reusing the bags supplied by stores (2).

Efforts on tackling litter will be less effective if the infrastructure for collecting, disposing of waste, and recycling is not upgraded. Plastic waste, at present volume, is fairly new with 50% of the plastic having been generated in the last 15 years. The fact that the density of plastics is a fraction of most other waste is creating serious operational and structural issues. For example, the uncompressed density of plastics is 30 kg/m³ while the density of fiber is 150 kg/m³ which has implication on the equipment for disposal but mostly for recycling fibers and plastics. The graph below shows comparative tonnage and possible volumes for Paper & paperboard (fiber) versus plastics in the United-States.

¹ www.sciencedirect.com

² <http://www.allaboutbags.ca/irelandandlitter.html>

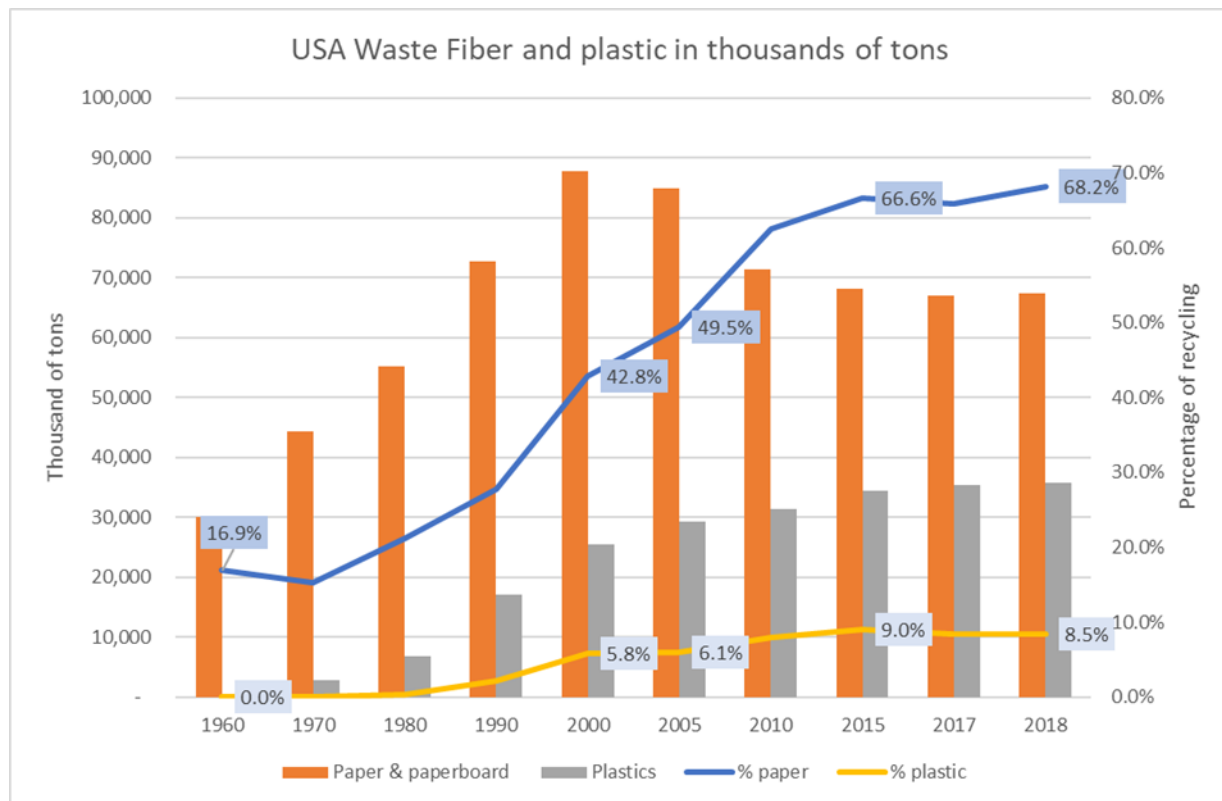


As can be seen the weight of fiber waste (blue columns) went down from 87 million tons in 2000 to 67 million tons in 2018. During the same period plastics (orange columns) went from 25 million tons to 35 million tons. The combined weight went down by 10 million tons or 9% but the combined volume goes up by 425 million of cubic meters or 26% because of the low density of plastics. This has a big a major impact on the transportation costs since as the extra volume means, more trips and higher costs on a weight basis. When deciding on different technologies for recycling the scale of the plants must take transportation costs into account, not only the financial costs but also the CO2 emissions.

As can be seen on the graph below recycling of fiber has been around since 1960 and in 2005 nearly 50% of plastic paper was recycled and in 2018 the its recycling rate was at 68%. On the plastic side recycling is relatively new and in 2018 only 8.5% of plastics were recycled.

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Looking at recycling of both fiber and plastics, in 2018 the weight of fiber recycled was 45 million tons/year, 15 times the weight/year of recycled plastics. It is evident that all the systems are adapted to fiber recycling as this is the main source of revenue for the collection centers. Currently, sorting centers do not separate plastics from other materials efficiently. As the sorting center is not efficient to separate the plastic from other contaminants, As the mix of waste changes, it they inevitably makes less revenue. They It gradually became less inclined to accept lighter plastics thus making it more difficult to increase recycling rates. To illustrate this point, it is estimated that a picking robot that can do 70 picks a minute will take 11 hours to pick 1 ton of plastic which is a losing proposition. A possible solution is to highly automate, reduce the number of categories and adapt the sorting towards a definite local market. For example, for post consumer plastics, a separation could be made of denser plastics (PET and PVC) from the rest (mostly LLPE, HDPE, PP, PS) at the same time other contaminants are eliminated (rocks, metal, glass water etc). The PET and PVC, if well cleaned, can be recycled. The mixed plastics can be pyrolyzed either to make diesel or naphta, the main feedstock to plastic production.

To recycle plastic into virgin plastic requires very low level of contamination, it must be 99.5% pure. This may be the reason China refuses to accept plastics that do not meet that specification. This can be very difficult to accomplish by mechanical means. Not only is it necessary to separate the plastics according to the 7 types of resin that are incompatible but, one must also take into consideration that plastic usually incorporate additives. The most commonly used additives in different types of polymeric packaging

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materials are: plasticizers, flame retardants, antioxidants, acid scavengers, light and heat stabilizers, lubricants, pigments, antistatic agents, slip compounds and thermal stabilizers. Some resins are easier to recycle such as PET and HDPE but it is important to limit the number of contaminants. To complement mechanical recycling there is chemical recycling. For example, pyrolysis can make diesel or naphtha from plastic. The naphtha that can be made back into virgin plastics. However, strongly emphasizing a market over another might be counter productive as the environmental cost of making naphtha or gas takes more energy than producing diesel and the yields are lower. For example: to pyrolyze plastics into to make naphtha takes more energy than producing diesel fuel, and yet, in the normal market diesel has a higher value than naphtha and can be sold locally. Its better for the environment to reduce both the collection radius and the product distribution area. Making plastics or other commodities (diesel) from recycled plastics is fairly new and the size of plants are small compared with those of established virgin plastic producers. It is important that renewable diesel and or renewable plastics be favored (pushed) in the same way as renewable gas is favored against natural gas.

With the high increase of waste plastics, the infrastructure for disposing and recycling needs to be reviewed. Already, plastic waste represents the biggest volume of all waste material. Because of plastic decomposes slowly it is important to reduce and clean up litter. Producers, importers, governments and individuals need to be part of the effort. Bans should be reserved to harmful components like PFAS and controls put on other halogenated components the same way that chlorine is regulated for paper. The collection and disposal system needs to be adapted to a lower density material. For recycling it is important to adapt the systems and equipment so that plastics can be sorted and cleaned efficiently. We believe it is important for governments to support end markets such as renewable diesel and plastics. It is also important to provide incentives to collect waste plastics so that it they do not end up as litter in the environment.

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² <http://www.allaboutbags.ca/irelandandlitter.html>