APPENDIX

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4/22/2024

I have been asked to speak today regarding our work in micro- and nanoplastics and the impacts of plastic pollution on human health.

Define MNP

First, I would like to begin the session with a definition of micro and nanoplastics (Figure 1).

Microplastics are small pieces of plastic less than 5 mm in a single dimension. These particles or fragments may be of any type of plastic, may be seen with the naked eye, and are often described as the size of and smaller than a sesame seed or a grain of sand.

Nanoplastics currently have two definitions depending on their source. In environmental studies, nanoplastics are defined as particles less than 1000 nm, or 1 micron. In laboratory studies, nanoplastics are defined as particles less than 100 nm. These are particles that are invisible to the naked eye and are in the size range of bacterium or a virus. Nanoplastics are approximately 1000 times smaller than microplastics.

These size definitions and disparity is an important nuance, as particles that are less than 100 nm have been shown to have to have unique characteristics and properties at this size, including the capability to cross biological barriers.

Where are they coming from?

The majority of microplastics are released from larger products. These may include microplastics from environmental sources including tire wear, incineration, landfill, or plastic waste. The primary wearing of bulk products to microplastics is through mechanical wearing and ultraviolet/thermal weathering, which weakens and fractures the product. Nanoplastics are produced from the breakdown of microplastics.

Plastics are initially produced through a series of chemical reactions, uniting single monomers to polymers, because of this, they cannot easily return to their monomer form. Therefore, any breakdown or degradation of the bulk plastics produces smaller and smaller pieces leading to micro- and nanosized fragments. Unfortunately, this does not mean that they are "gone".

Found in the environment

International (Air/Land); Local (Raritan, air)

Microplastics have been found on all continents and in all landscapes. They have been found in urban air, glacier water, and remote locations. The glacial and remote deposition are theorized to be associated with air travel and particle deposition.

These are not only concerns of "other places", but here in NJ scientists at Rutgers University have identified microplastics within the Passaic and Raritan rivers (Figure 2), as well as the Raritan-Hudson Estuary (Ravit, 2017; Bailey, 2021). Scientists identified storm water as a primary contributor (Bailey, 2021).

Of equal concern, microplastics have also been measured in indoor air. These measures can often be more than 100 times greater than measures of outdoor air (Kacprzak, 2022).

Food/Beverages

Microplastics have also been found in food and beverage sources. These are not limited to highly processed foods, with the particles being introduced to the product with packaging or preparation, but have been identified within the source products. This not only includes well-identified ocean-based products, but also includes the pollens to make honey (Alma, 2023), farmlands for agriculture (Lofty, 2022), the water for irrigation (Lofty, 2022).

These products include: tap water, bottled water, beer, wine, sea salt, honey, rice, produce, and a variety of protein sources (Kosuth, 2018; Mason, 2018; Alma, 2023; Dessi, 2021, Dong, 2021; Milne, 2024).

Nanoplastics

Nanoplastics are plastic particles at least 1000 times smaller than a microplastic particle. As microplastics have been identified in environmental and domestic settings, it is likely that nanoparticles persist in these settings as well. However, because of their small size, nanoplastics are exceedingly difficult to identify, visualize, or quantify. Only a very few studies have measured nanoparticles within the environment or consumable products.

Recently, our collaborative group with Columbia University identified hundreds of thousands of nanoplastic particles within three different brands of commercially available bottled water using a specialized microscope (Qian, 2024). This is especially notable as this technique first verified the number of microplastic particles that had been previously measured and continued by identifying and quantifying particles as small as 200 nm in diameter.

Prior to our work, the National Institute of Standards and Technology had found that use of common disposable consumer products, and the temperature at which they are used, could release trillions of nanoplastic particles (Zangmeister, 2022).

2x

Human Exposure

Given this, humans may be exposed to micro- and nanoplastics through dermal (skin), inhalation (lungs), or ingestions (gut) routes. Microplastics particles have been identified in human patient (Jenner, 2022) and cadaver lung (Amato-Lourenco, 2021) samples, as well as human feces (Schwabl, 2019; Ho, 2022). These outcomes provide evidence of human inhalation and ingestions exposure.

Particle Translocation

Of greater concern, micro- and nanoplastics do not stay at or within the site of exposure. To date, plastic particles have been identified in human lung (above), liver (Horvatits, 2022), kidney (Massardo, 2024), urine (Massardo, 2024), heart (Yang, 2023), placenta (Ragusa, 2021; Garcia, 2024), and breastmilk (Ragusa, 2022).

Trends within human tissues has identified an increase in particle deposition. Recently, placental samples acquired over the last 15 years in Hawaii were evaluated for microplastic contamination. These studies identified that in 2006, only 60% of the samples contained microplastics, rising to 90% in 2013, and 100% in 2021 (Figure 3) (Weingrill, 2023).

In animal models, we and others have recapitulated these findings. Not only have micro- and nanoplastic particles been identified throughout the organs of rodent models of exposure, but concernedly, micro- or nanoplastics in the brain of mice after 3-weeks of exposure via drinking water (Gasper, 2023). Recently another study identified micro- and nanoplastics within the brain, kidney, lungs, and liver after exposure via drinking water for 4-weeks (Garcia, 2024).

My laboratory has identified nanoplastic particles within the placenta and fetal tissues (e.g., lung, heart, kidney, liver, and brain) or rats samples within 24-h of maternal exposure through the gut or lungs (Figure 4) (Cary, 2023; Fournier, 2020).

Overall Human Health

To date, few studies have identified a link between micro- or nanoplastic exposure or deposition directly to a human health outcome. Recently, two studies have identified a positive correlation or association with microplastic particles and human health concerns, centralizing around inflammation.

- The concentration of fecal microplastics has been associated with the severity of inflammatory bowel disease (Yan, 2021)
- The deposition of micro- and nanoplastics within the carotid plaque of cardiovascular disease patients was correlated with increased inflammation within the site and increased the risk of future cardiovascular episodes (Marfella, 2024).

Studies are currently ongoing to identify the dose, route of exposure, type of plastic, and cellular interactions that may lead to the greatest toxicities.

3x

Future Directions/Concerns/Takeaways

- According to the United Nations Environment Program, 9.2 billion tons of plastic was made between 1950 and 2017. In 2022 they estimated that 400 million tons of plastics are produced per year. These production rates are estimated to continue to increase exponentially, leading to the production of 590 million tons by 2050. A 30% increase from estimates of 2025 production. These products will inevitably be discarded, breakdown, and continue to collect within the environment as micro- and nanoplastic particles.

- Sample collections or filtrations have often included netting with pores approximately 333µm, allowing for the passage of all nanosized particles. Thus, many studies underrepresent the number of micro- or nanoplastic particles within the original sample.

- Plastic has the capability to adsorb and release additional carried chemicals, highlighting the material as a vector for additional toxicants. These chemicals may be added during the production of the plastic (i.e., plasticizing endocrine disrupting chemicals [BPA, PFOAs]) or due to interactions during the product lifecycle (i.e., carbonaceous/metallic materials during incineration/energy recovery).

- Overall, micro- and nanoplastics are ubiquitous and pervasive. These particles have been found everywhere scientists have looked. If there is a location, product, or tissue that has not yet been identified, it is likely that this product or tissue has not yet been examined.

- We know that these particles are entering our environment and our bodies. We do not yet understand how, if, or when they may be eliminated. Therefore, bioaccumulation of micro- and nanoplastics over one's lifetime is concerning.

- Federal and state support is paramount to unravel the human health concerns of micro- and nanoplastic particle exposure.

4x

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Bailey, 2021: https://www.sciencedirect.com/science/article/pii/S0045653521003556?via%3Dihub

Kacprzak, 2022: https://www.sciencedirect.com/science/article/pii/S2213343722002329

Alma, 2023: https://pubmed.ncbi.nlm.nih.gov/36642174/

Lofty, 2022: https://www.sciencedirect.com/science/article/pii/S0269749122004122

Kosuth 2018: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0194970

Mason, 2018: https://www.frontiersin.org/articles/10.3389/fchem.2018.00407/full

Dessi, 2021: https://www.sciencedirect.com/science/article/pii/S0304389421007421?via%3Dihub

Dong, 2021: https://www.sciencedirect.com/science/article/pii/S0304389421000194#fig0025

Milne, 2024: https://www.sciencedirect.com/science/article/pii/S0269749123022352

Quin, 2024: https://www.pnas.org/doi/abs/10.1073/pnas.2300582121

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Jenner, 2022: https://www.sciencedirect.com/science/article/pii/S0048969722020009

Amato-Lourenco, 2021: https://www.sciencedirect.com/science/article/pii/S0304389421010888

Schwabl, 2019: https://www.acpjournals.org/doi/10.7326/M19-0618

Ho, 2022: https://www.mdpi.com/2305-6304/10/8/414

Massardo, 2024: https://www.sciencedirect.com/science/article/pii/S0160412024000308

Horvatits, 2022: https://www.thelancet.com/journals/ebiom/article/PIIS2352-3964(22)00328-0/fulltext

Yang, 2023: https://pubs.acs.org/doi/abs/10.1021/acs.est.2c07179

Ragusa, 2021: https://www.sciencedirect.com/science/article/pii/S0160412020322297

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Gasper, 2023: https://www.mdpi.com/1422-0067/24/15/12308

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Garcia, 2024: https://ehp.niehs.nih.gov/doi/10.1289/EHP13435

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Yan, 2021: https://pubs.acs.org/doi/10.1021/acs.est.1c03924

Marfella, 2024: https://www.nejm.org/doi/full/10.1056/NEJMoa2309822

UN Environment Program: https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/36964/VITGRAPH.pdf

Figure 1: Sizes of micro- and nanoplastic particles (Adapted from Sosnov, 2009)

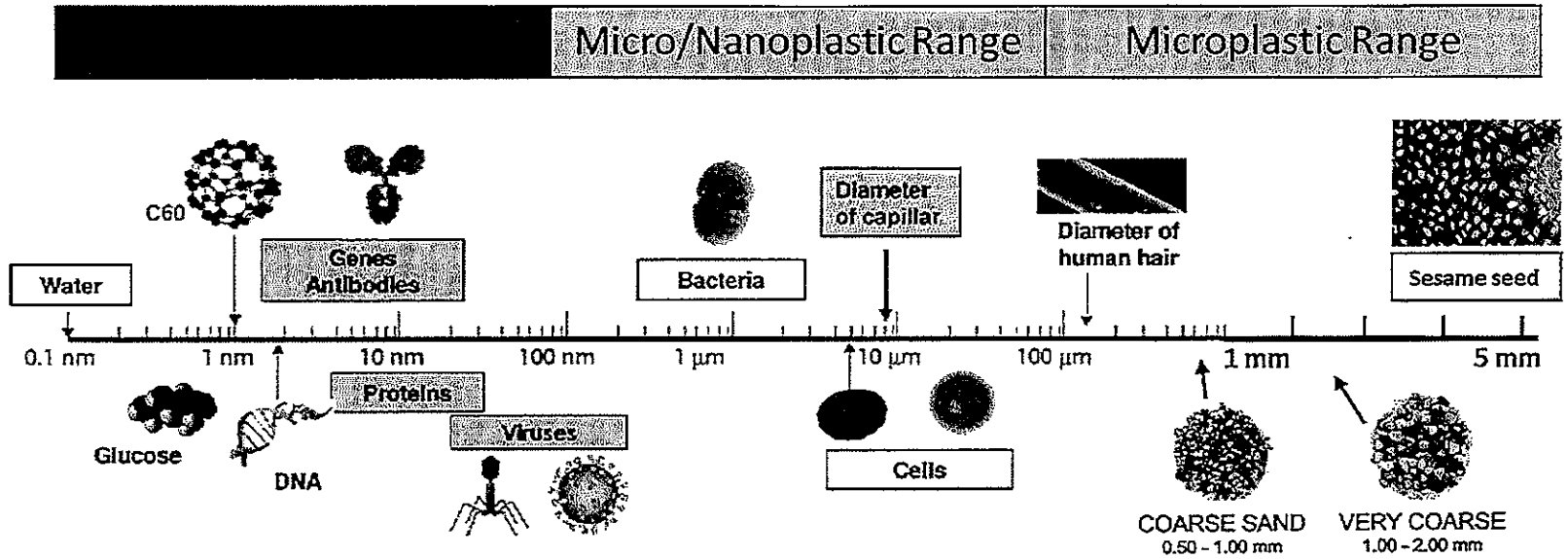
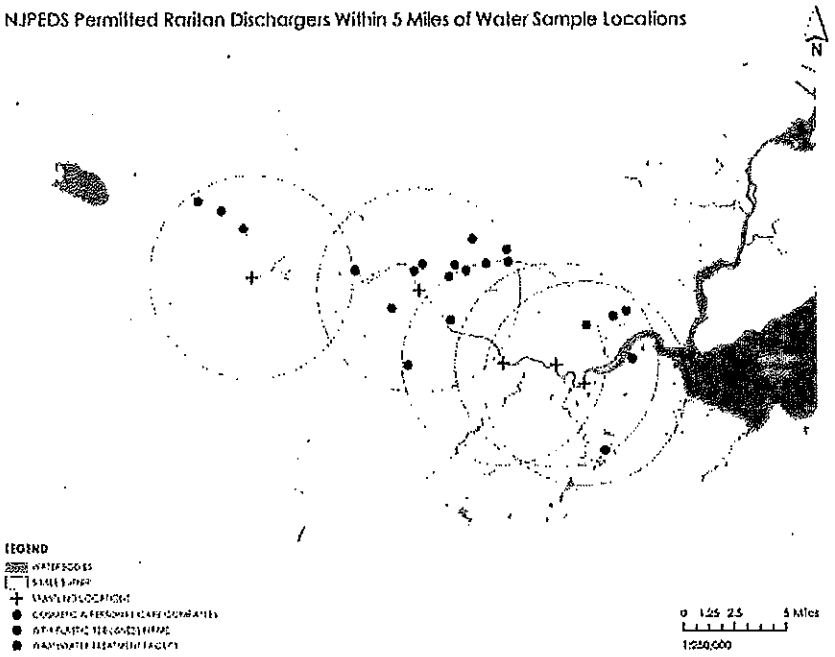
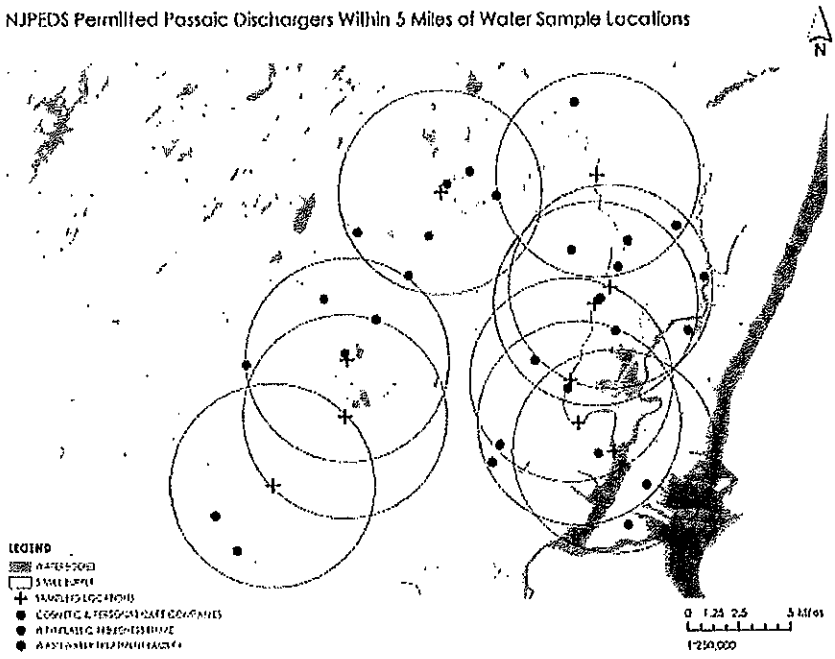


Figure 2: Sampling locations within the Passaic and Raritan rivers (Ravit, 2017)



(a)



(b)

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Figure 3: Hawaiian placental samples containing microplastics (Weingrill, 2023)

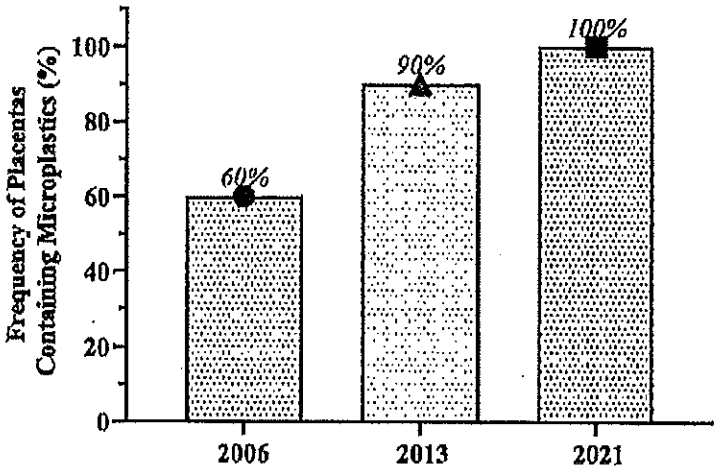
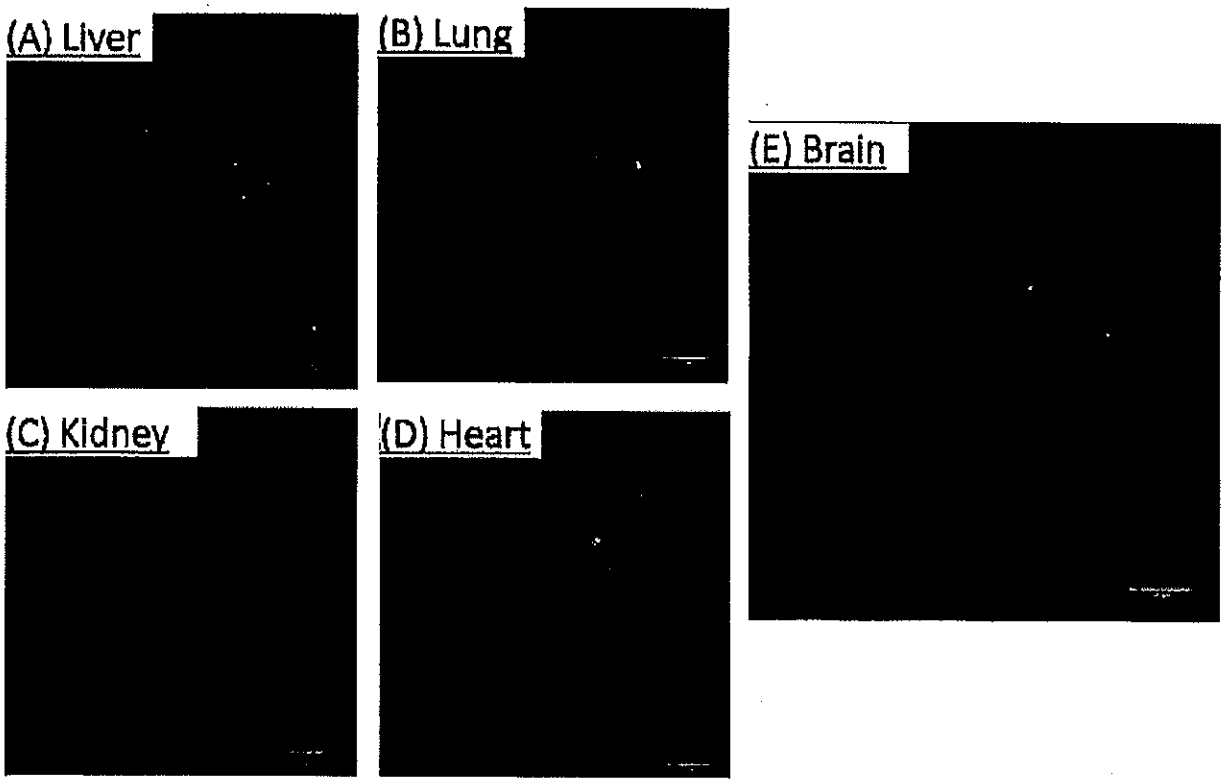


Figure 4: Nanoplastics deposited in fetal tissues after maternal exposure during pregnancy (Fournier, 2020)



Testimony of Gary Sondermeyer
Vice President of Operations
Bayshore Family of Companies
Representing the Association of New Jersey Recyclers
Joint Senate & Assembly Environment Committee Hearing
Plastics and Public Health
April 22, 2024

Good Morning Chairman Smith and esteemed members of the joint Senate Environment and Energy and Assembly Environment, Natural Resources, and Solid Waste Committees. My name is Gary Sondermeyer, Vice President of Operations at the Bayshore Family of Companies. Thank you for the opportunity to offer brief testimony today on behalf of the Association of New Jersey Recyclers (ANJR) regarding methods to protect against, or mitigate, the negative effects of plastic pollution on human health and the environment through plastic waste reduction and recycling.

Recycling absolutely helps mitigate the effects of plastic pollution by bringing post-consumer material to manufacturers to reduce virgin petrochemical manufacturing. Plastics recycling in New Jersey is highly effective. Through our Recycling Enhancement Act and municipal tonnage grants program we have one of the most detailed databases of recycling in the country. DEP certified data for 2020 showed the State recovered 113,000 tons of plastic containers and 14,000 tons of other plastics for a total of 127,000 tons of material. We achieved an overall 75% container recycling rate and 57% plastic container recycling rate. This trend in plastics recycling is also quite consistent as total plastics recycled over the past 5 years averaged about 133,000 tons per year.

From a climate perspective, according to USEPA, on average, approximately 1.67 metric tons of Carbon Dioxide (CO2) equivalents are avoided for every ton of municipal solid waste recycled. Further, for every pound of recycled PET plastic flake used (in lieu of virgin petrochemical feedstock) greenhouse gas emissions are reduced by 71%. (National Association for PET Container Resources).

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As general background for the joint committee, through the leadership of our State Legislature, New Jersey became the first state to pass Mandatory Recycling in the nation 37 years ago in 1987. Nearly our entire population in our 564 municipalities has access to curbside collection of mandated recyclables, including plastics. All 21 counties require the recycling of #1 PET and #2 HDPE plastic containers and many also require #5 Polypropylene, such as yogurt cups.

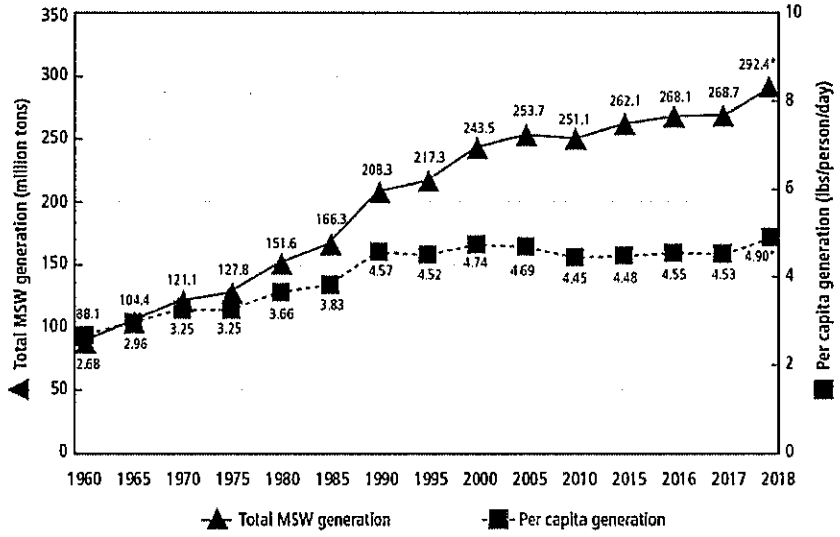
All this material goes to an infrastructure of some 23 publicly and privately owned and operated intermediate processing facilities, commonly referred to as MRF's. Most simplistically, these facilities take back apart what we mix together and place at the curb and sell them to markets to manufacturer new products and reduce dependence on virgin feedstocks. Rhetorical media accounts that "recyclables just go right in the garbage" is utterly false, and frankly, economically absurd. I would like to provide a brief illustration.

I work for Bayshore Recycling in Woodbridge Township. We accept curbside recyclables from about 60 New Jersey municipalities including Woodbridge and Edison in Middlesex County and Rahway and Linden in Union County. We accept material from an aggregate New Jersey population of about 1.2 million people. The average cost of disposal in New Jersey is $90/ton. In the Bayshore example, we can accept under our DEP approval 1,000 tons per day or 5,000 tons per week of comingled recyclables. If we accepted and then simply landfilled the material we accept we would run $125,000 in the red per week or $500,000 per month. Bankruptcy would be swift. To the contrary, we sell nearly all the plastics we accept to viable, North American markets. In fact, plastics are the highest revenue materials after aluminum cans. Average revenue for plastic containers exceeded $300/ton at one public recycling facility last year. Compare an average disposal cost of $90/ton to a recycling revenue of $300+/ton and we can clearly state that plastics recycling is very real and very solid. Accounts to the contrary are false and terribly misleading to our public.

I'd like to quickly turn to waste reduction. This is our highest priority toward sustainable materials management in both the national USEPA and State DEP waste management hierarchy. Unfortunately, this is where we have

historically failed and where we need to dramatically change societal behavior. Both nationally and in New Jersey waste reduction efforts have largely been ineffective. The following table from the USEPA's "Advancing Sustainable Materials Management: 2018 Fact Sheet" (most recent national data available) graphically tells the tale in presenting some 58 years of municipal solid waste generation data. The bottom line: we continue to generate more waste each year, even when population increases are accounted for through per capita waste generation estimates. While we have some excellent examples of waste reduction initiatives across the US and in New Jersey, none are really in practice at a substantial scale.

Figure 1. MSW Generation Rates, 1960 to 2018*



Another hat I am honored to wear on a voluntary basis is serving as Vice Chair of the Governor's Plastics Advisory Council (PAC), now nearing completion of our second year of work. This past year my colleague Nandini Checko from the Association of New Jersey Environmental Commissions (ANJEC) and I convened some 34 national and state experts in waste reduction during 4 highly informative stakeholder meetings. Our focus was on identifying ways to advance disposal free dining to eliminate the use of single-use plastics, running zero waste events, and advancing plastics waste reduction in schools, businesses and government facilities.

Our second-year report is not yet final, but our stakeholder discussions clearly showed the need for the PAC to establish an ongoing focus on plastic waste

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reduction. We will likely recommend the formation of a waste reduction steering committee made up of many of the national and state experts who participated in our stakeholder discussions. We will also identify short and long term actions this steering committee should study further toward making very specific recommendations to the DEP in the third-year of PAC work. Some of these actions may lend themselves to legislative proposals for our esteemed Senate and Assembly committees to consider. We hope to have our second-year report finalized in May or June of this year.

While plastics recycling has proven to be effective, we know we can and must do better. The nearly 350 members of ANJR: our municipalities, all 21 counties, and private sector recyclers, all support efforts to increase the scope and effectiveness of existing waste reduction and recycling programs moving forward. How can we do this? Like any societal program dependent on human behavior and behavioral change, there is no simple answer, but rather a complex set of strategies that must be considered and implemented.

ANJR strongly supported the Recycled Content legislation passed through your committees and which reached milestone implementation targets this past January. ANJR considered this legislation the most important piece of recycling legislation since the passage of the Mandatory Recycling Act back in 1987. In April 2022, the New Jersey Recycling Market Development Council created by your committees completed its report and recommendations. The 15 recommendations of the Council are all being worked on at this time through the efforts of ANJR and the PAC. (report link: https://www.nj.gov/dep/dshw/recycling/RMDC.pdf). One common theme is the need for enhanced and ongoing public education and outreach. There is no question that recycling in New Jersey remains too confusing for residents and businesses. ANJR is hosting stakeholder discussions to consider a uniform list across all counties of materials required for recycling. Such programs currently exist in such States as Oregon, Colorado and in Connecticut. Coupled with our study of a uniform list of curbside recyclables, ANJR is also working with the PAC in holding Truth in Labeling discussions which have been closely linked together in sister states. Financial assistance programs were also identified as essential to upgrade existing recycling

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processing facilities across the state to enable the receipt of a uniform list of materials and to enhance the quality of end-product. Extended Producer Responsibility legislation may provide the most comprehensive direction for the future of recycling.

While we have collectively accomplished much through four decades of mandatory recycling in New Jersey, we have much to do, particularly to further advance both reduction and recycling of plastics to even further displace virgin petrochemical manufacturing. ANJR looks forward to working with the legislature, DEP and sister non-profit organizations in this regard.

Thank you again for the opportunity to testify today on behalf of ANJR and I would be most happy to answer any questions you may have.

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BEYOND PLASTICS

Testimony of Judith Enck, President of Beyond Plastics
to the Senate Environment and Energy Committee
and the Assembly Environment, Natural Resources, and Solid Waste Committee
Trenton, New Jersey
April 22, 2024

Thank you for the invitation to offer testimony today. My name is Judith Enck, and I am the founder and president of Beyond Plastics, a nonprofit that aims to end plastic pollution everywhere. I am on the faculty of Bennington College in Vermont, and I served as Regional Administrator for Region 2 at the U.S. Environmental Protection Agency, appointed by President Barack Obama. Happily, Region 2 included New Jersey.

The production, use, disposal and transportation of plastics is a vitally important issue that threatens human health, the health of our oceans, environmental justice communities, and our ability to avoid the worst impacts of climate change.

A. PROBLEMS WITH PLASTICS

1. Human health impacts

Plastics are made from ethane, often a by-product of hydrofracking, and 16,000 different chemical additives.

Chemicals in plastics get into our bodies in various ways. They may **leach directly** from plastic packaging into our food and beverages[1] – the word for this process is "migration." It means that some of the chemicals embodied in the plastic packaging leak out of the packaging and into the packaged food or beverage.

Chemicals can also "hitchhike" on **microplastics or nano-plastics that are shed from packaging** into our food and beverages.[2] This shedding is especially likely to happen when plastic is microwaved,[3] so don't microwave plastic storage containers, cups and bowls, or take-out boxes.

We're eating and drinking these chemical hitchhikers because microplastics have been found in nearly every type of food and drink you can imagine: bottled water;[4] beer, soft drinks, tea, and energy drinks;[5] fruits and vegetables;[6] honey;[7] meat and milk;[8] and seafood.[9]

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[1] "Nano- and Microplastics Migration from Plastic Food Packaging into Dairy Products: Impact on Nutrient Digestion, Absorption, and Metabolism." Kaseke *et al.*, Foods., August 14. 2023.
[2] "Chemicals in Plastics - A Technical Report." U.N. Environment Programme, May 3, 2023.
[3] "Assessing the Release of Microplastics and Nanoplastics from Plastic Containers and Reusable Food Pouches: Implications for Human Health." Hussain, *et al.*, Environmental Science & Technology, June 21, 2023.
[4] "Occurrence of microplastics in commercially sold bottled water." Huan *et al.*, *Science of The Total Environment*, Volume 867, April 1 , 2023.
[5] "First study of its kind on the microplastic contamination of soft drinks, cold tea and energy drinks: Future research and environmental considerations." Shruti *et al.*, *Science of the Total Environment*, Volume 726, July 15, 2020.
[6] "Occurrence of Microplastics in Most Consumed Fruits and Vegetables from Turkey and Public Risk Assessment for Consumers." Aydın *et al.*, *Life (Basel)*, August 4, 2023.
[7] "Microplastics in Honey, Beer, Milk and Refreshments in Ecuador as Emerging Contaminants." Diaz-Basantes *et al.*, *Sustainability*, Volume 12, Issue 14, July 8, 2020.
[8] "Plastic Particles in Livestock Feed, Milk, Meat and Blood A Pilot Study." van der Veen *et. al.*, Report EH22-01, for the Plastics Soup Foundation. April 29, 2022.
[9] "Microplastics in Seafood and the Implications for Human Health." Smith *et al.*, *Current Environmental Health Reports*, August 16, 2018.

Microplastics have been found in animal feed, so it stands to reason that they've shown up in meat and milk.[10] Same with fruits and vegetables: microplastics are sometimes in the soil and water, and plants take them up in the vasculature of their roots and stems as they grow.

You can avoid ingesting pesticides by buying organic meats or vegetables, but you ***cannot avoid ingesting microplastics: they are literally everywhere.***

With all of these routes of exposure, it's not surprising that microplastics have been found throughout the human body. Scientific journal articles are coming out at breakneck speed – showing that microplastics have been found in human lungs;[11] in our blood,[12] liver, and fatty tissues;[13] in our kidneys;[14] and in breastmilk.[15]

They've crossed two boundaries that were once considered impenetrable: the blood-brain barrier[16] and the placenta.[17] Just two months ago, researchers from the University of New Mexico reported finding microplastics in all 62 of the placenta samples they tested, with concentrations ranging from 6.5 to 685 micrograms per gram of placental tissue.[18] And remember that the fetus is in the placenta typically for only 8 to 9 months.

Knowing this, you now won't be surprised to learn that microplastics have been found in meconium: a baby's first stool.[19] In other words: newborns are being born pre-polluted with plastic.

Scientists estimate that the average person consumes hundreds of thousands of microplastic particles each year, through just eight food types as well as inhalation.[20]

Plastics pose an increasing threat to human health.

Last month, the New England Journal of Medicine published findings that patients with microplastics or nanoplastics (MNPs) found in samples of plaque taken from their carotid arteries were at **four-fold increased risk** of experiencing **cardiac incidents** – including myocardial infarction (heart attack), stroke, and death – than patients without MNPs in their plaque specimens.[21] The plaque specimens studied included polyvinyl chloride (PVC) and polyethylene, both of which are used in plastic packaging.

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[10] "Plastic Particles in Livestock Feed, Milk, Meat and Blood A Pilot Study," van der Veen *et. al.*, Report EH22-01, for the Plastics Soup Foundation. April 29, 2022.
[11] "Presence of airborne microplastics in human lung tissue." Amato-Lourenço *et al., Journal of Hazardous Matererials*, August 15, 2021.
[12] "Discovery and quantification of plastic particle pollution in human blood." Leslie *et al., Environment International*, Volume 163, May 2022.
[13] "Methods for microplastics, nanoplastics and plastic monomer detection and reporting in human tissues." Presentation to a meeting of the American Chemical Society, August 17, 2020.
[14] "Microplastics and Kidneys: An Update on the Evidence for Deposition of Plastic Microparticles in Human Organs, Tissues and Fluids and Renal Toxicity Concern." La Porta *et al., International Journal of Molecular Sciences*, 24(18), September 21, 2023.
[15] "Raman Microspectroscopy Detection and Characterisation of Microplastics in Human Breastmilk." Ragusa *et al., Polymers*, 14(13), June 30, 2022.
[16] "Micro- and Nanoplastics Breach the Blood–Brain Barrier (BBB): Biomolecular Corona's Role Revealed." Kopatz *et al., Nanomaterials* 13(8), April 19, 2023.
[17] "Plasticenta: First evidence of microplastics in human placenta." Ragusa *et al., Environment International*, Jan. 2021.
[18] "Quantitation and identification of microplastics accumulation in human placental specimens using pyrolysis gas chromatography mass spectrometry." Garcia *et al., Toxicological Sciences*, February 17, 2024.
[19] Detection of various microplastics in placentas, meconium, infant feces, breastmilk and infant formula: A pilot prospective study. Liu *et al., Science of The Total Environment.* Volume 854, January 1, 2023.
[20] "Lifetime Accumulation of Microplastic in Children and Adults." Nor *et al., Environmental Science and Technology*, March 16, 2021.
[21] "Microplastics and Nanoplastics in Atheromas and Cardiovascular Events," Marfella, *et al., New England Journal of Medicine*, March 7, 2024.

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Other health effects of chemicals in plastics include breast, ovarian, testicular, and kidney cancer; obesity and Type 2 diabetes; intellectual disabilities; endometriosis; and male infertility (reduced sperm count) – just to name a few.

A recent study published in the Journal of the Endocrine Society, "Chemicals used in plastic materials: an estimate of the attributable disease burden and costs in the United States,"[22] reported that an estimated **$250 billion** in annual U.S. health care expenditures is attributable to four classes of chemicals commonly used in plastics: polybrominated diphenylethers (PBDEs), orthophthalates, bisphenols, and per- and polyfluoroalkyl substances (PFAS, also known as "forever chemicals").[23]

2. Plastic pollution in the oceans and on land

As a coastal state, New Jersey has a keen interest in the health of the ocean: one estimate places the value of commercial and recreational fishing in New Jersey at $8 billion per year.[24]

Unfortunately, plastic pollution has been turning the ocean into a watery landfill. Estimates are that 16-30 billion pounds of plastics enter the ocean each year: the equivalent of emptying one or two garbage trucks full of plastic into the ocean every minute.[25] And since plastic doesn't **break** ***down*** (biodegrade) – it only **breaks** ***up*** into smaller and smaller pieces – the amount of plastic pollution in the ocean is growing larger as we meet here today. In 2021, the United Nations Environment Programme estimated that 75 to 199 million tons of plastic debris had accumulated in the oceans over time.[26]

This plastic pollution is taking a heavy toll on marine life and ecosystems. It is everywhere—from wetlands to the ocean floor, including the 7-mile deep Marianas Trench.[27] Macroplastics – those pieces you can see with the naked eye – are harming fish, sea turtles, marine mammals, and sea birds. Last year, scientists reported that seabirds' digestive tracts were being damaged by ingesting plastic and gave the disease a new disturbing new name: plasticosis.[28] Estimates are that almost 100% of seabirds will be ingesting plastic by 2050.[29]

Microplastics and nanoplastics are also problematic because they transmit toxic chemicals to ocean species. An estimated 16,000 chemical additives are used in making plastic products to give them color, UV resistance, flexibility, and other properties. More than 4,200 of these are known to be toxic, and/or persistent, bioaccumulative, or mobile in the environment. An even larger number have not been studied.[30] Micro- and nanoplastics *retain* the toxic additives that were introduced during manufacturing, and they *attract and hold onto* toxic pollutants in the water, including pesticides and hormone-disrupting

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[22] "Chemicals used in plastic materials: an estimate of the attributable disease burden and costs in the United States." Trasande *et al.*, *Journal of the Endocrine Society*, Volume 8, Issue 2, February 2024.

[23] "Chemicals used in plastic materials: an estimate of the attributable disease burden and costs in the United States." Trasande *et al.*, *Journal of the Endocrine Society*, Volume 8, Issue 2, February 2024.

[24] "New Jersey's $8 Billion Fishing Industry among Top in Nation, Supports 52,000 Jobs." Shore Report, TapInto.net. Dec. 24, 2018.

[25] Low end of range (8 million): "The New Plastics Economy: Rethinking the future of plastics." World Economic Forum, Jan. 2016. High end of range (15 million): "Preventing Ocean Plastics." Pew Charitable Trust, web page accessed 4/17/24.

[26] "From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution." UN Environment Programme, 2021.

[27] "Plastic in Mariana Trench." National Oceanic and Atmospheric Administration's Science on a Sphere webpage, accessed Dec. 11, 2022.

[28] "'Plasticosis': Characterising macro- and microplastic-associated fibrosis in seabird tissues." Hayley S. Charlton-Howard et al., *Journal of Hazardous Materials*, Volume 450, 15 May 2023, 131090.

[29] "Threat of plastic pollution to seabirds is global, pervasive, and increasing." *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, August 31, 2015.

[30] "State of the science on plastic chemicals: Identifying and addressing chemicals and polymers of concern." PlastChem, 2024.

chemicals.[31] A 2021 study found that they limit the growth and abundance of microscopic marine life,[32] with troubling implications for all organisms in the ocean food chain.

Plastic pollution isn't limited to the ocean. They've been detected at every conceivable place on Earth, from the Antarctic[33] to Mount Everest.[34] They've been found in soils where crops are grown,[35] in the vasculature of plants,[36] in clouds,[37] in wind and rain,[38] in drinking water,[39] and in air.[40]

3. Plastic is Plan B for the Fossil Fuel Industry

Plastics pose a major threat to our ability to avoid the worst projected impacts of climate change. Made from chemicals and fossil fuels (primarily ethane, produced by hydrofracking), plastics produce climate-warming greenhouse gasses at every stage of their lifecycle: from extraction to production to creation to usage to disposal. As we note in our 2021 report, "The New Coal: Plastics and Climate Change," the U.S. plastics industry's contribution to climate change is on track to exceed that of coal-fired power in this country by 2030.[41] As of 2020, the U.S. plastics industry is responsible for at least 232 million tons of carbon dioxide-equivalent greenhouse gas emissions each year. This is equivalent to the emissions from 116 average-sized (or 500 megawatt) coal-fired power plants.

A report released on April 18, 2024 found that the greenhouse gas emissions associated with plastics production could triple by 2050: accounting for **one fifth of Earth's remaining carbon budget.**[42]

Petrochemical companies see falling demand for their products in their traditional markets for transportation and electricity generation. In response, they are increasing plastics production to make up the difference. This increased production is largely canceling out any greenhouse gas reductions gained from the recent closures of 65% of the country's coal-fired power plants.

4. Environmental justice: plastics are a major threat

The negative impacts of plastic production and disposal fall disproportionately on low-income communities and communities of color.

Because only 5-6% of plastics are recycled, the majority of plastics are sent to landfills, incinerators or are littered in the environment. This is a serious problem in New Jersey where there are four garbage incinerators operating in Camden, Essex, Gloucester, and Union counties.[43]

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[31] "The Plastics Plague: Marine Mammals and our Oceans in Peril," International Marine Mammal Project of Earth Island Institute, 2022.
[32] "Microplastics hinder the growth of microscopic marine animals." *Frontier Science News,* Aug. 17, 2021.
[33] "First evidence of microplastics in Antarctic snow." Aves *et al.*, *The Cryosphere,* 16, 2127–2145, 2022.
[34] "Reaching New Heights in Plastic Pollution—Preliminary Findings of Microplastics on Mount Everest," Napper et al., *Information One Earth,* Volume 3, Issue 5, November 20, 2020.
[35] "Microplastics in the soil environment: A critical review." Sajjad et al., *Environmental Technology & Innovation,* Vol. 27, August 2022.
[36] "Interactions between microplastics/nanoplastics and vascular plants." Yin *et al.*, *Environ Pollution.* Dec.. 1, 2021.
[37] "Clouds now contain plastic, risking contamination of 'everything we eat and drink: Airborne plastic particles found in cloud water." Vishwam Sankaran, *The Independent,* Sept. 28, 2023.
[38] "Plastic rain in protected areas of the United States." Brahney et al., *Science,* Vol. 368, Issue 6496, June 12, 2020.
[39] "Occurrence of microplastics in tap and bottled water: Current Knowledge." Gambino *et al.*, *International Journal of Environmental Research and Public Health,* 19(9), 5283, May 2022.
[40] "Microplastics in air: Are we breathing it in?" Gasperi *et al.*, *Current Opinion in Environmental Science & Health,* Volume 1, February 2018.
[41] "The New Coal: Plastics and Climate Change." Beyond Plastics, October 2021.
[42] "Plastic-production emissions could triple to one-fifth of Earth's carbon budget – report." Sharon Lerner, *The Guardian,* April 18, 2024.
[43] "Authorized New Jersey Incinerators." New Jersey Department of Environmental Protection, Division of Sustainable Waste Management. Website accessed April 19, 2024.

When plastic is burned, dioxin is formed - one of the most toxic chemicals known to science.

The U.S. plastics industry reported releasing 114 million tons of greenhouse gasses nationwide in 2020, 90% of which occurred in just 18 communities where residents earn 28% less than the average U.S. household, and are 67% more likely to be people of color. While greenhouse gas releases don't *directly* impact the health of residents in fenceline communities, they are an *indicator* of other air pollutants that do, including particulates, ground level ozone, and toxic chemicals. When plastics arrive at the end of their (often very short) lives, the landfills and incinerators they are sent to are also overwhelmingly located in low-income communities and communities of color,[44] burdening residents with asthma and chronic bronchitis.[45] Even plastic recycling facilities are a potential hazard.[46] Plastic is flammable, and fires at recycling storage facilities have affected many low-income communities or communities of color.

Your zip code should not determine the condition of your health, yet it does for many communities living near petrochemical facilities. Reducing the production of plastics by half will provide some relief.

B. FALSE SOLUTIONS

1. We cannot recycle our way out of the plastic pollution problem

Individuals and schools and businesses should all keep source separating paper, cardboard, glass, and metal. We need to ramp up composting of yard and food waste. But plastic recycling has been an abysmal failure.

In 2021, the U.S. had a dismal recycling rate of about 5% for post-consumer plastic waste.[47] And we're learning now that even when we *do* recycle plastics, we may not want to use some of the resulting products. A "bottle-to-bottle" process has long been considered the holy grail of recycling, but new evidence suggests that food-grade packages should not be made with recycled plastics because there are too many toxic additives that leach out into the food and drink they contain.

The failure of plastics recycling lies not with the concept or the process, but with the material itself. The first problem is that there are thousands of different plastics, each with its own composition and characteristics.[48] They all include different chemical additives and colorants that cannot be recycled together, making it impossible to sort the plethora of discarded plastics into separate types for processing. For example, polyethylene terephthalate (#1 PET) bottles cannot be recycled with #1 PET clamshells, and green #1 PET bottles cannot be recycled with clear #1 PET bottles (which is why South Korea has outlawed colored PET#1 bottles.)[49] High-density polyethylene (#2 HDPE), polyvinyl chloride (#3 PVC), low-density polyethylene (#4 LDPE), polypropylene (#5PP), and polystyrene (#6PS) all must be separated for recycling.

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[44] "New Jersey's Dirty Secret: The Injustice of Incinerators and Trash Energy in New Jersey's Frontline Communities," Earth Justice and Vermont Law School Advocacy Clinic, Inc., February 2021.; "U.S. Municipal Solid Waste Incinerators: An Industry in Decline," Tishman Environment and Design Center, The New School. May 2019.
[45] "Written Report of George D. Thurston Regarding the Public Health Impacts of Air Emissions from the Wheelabrator Facility." Chesapeake Bay Foundation, November 20, 2017; Breathe Free Detroit webpage, accessed Dec. 10, 2022.
[46] "Fires at Plastic Recycling Facilities," The Last Beach Cleanup, webpage accessed Dec. 11, 2022.
[47] "NREL Calculates Lost Value of Landfilled Plastic in U.S." National Renewable Energy Laboratory (NREL) news release, April 28, 2022.
[48] "Types of Plastic: How Many Kinds of Plastics are There?" Plastics Make It Possible®, January 18, 2012. Website accessed Dec. 11, 2022.
[49] "No colour, no PVC: South Korea bans hard-to-recycle plastic materials for F&B packaging," Pearly Neo, *FoodNavigator-Asia.com*, January 31, 2020.

Another problem is the toxicity of the various chemicals and colorants in plastic products. According to a report published by the Canadian government, toxicity risks in recycled plastic prohibit "the vast majority of plastic products and packaging produced" from being recycled into food-grade packaging.[50]

Finally, plastic recycling often is not economical. Recycled plastic costs more than virgin plastic made from petrochemicals because collecting, sorting, transporting, and reprocessing plastic waste is expensive.

Despite this stark failure, the plastics industry has waged a decades-long public relations campaign to perpetuate the myth that the material is recyclable.[51]

New Jersey should stop exporting plastics to countries that don't have recycling markets. The US and Europe send massive amounts of plastic waste to Indonesia, Vietnam, the Phillipines, Turkey, and now countries in Africa. Most of these countries lack viable recycling markets, and the exports should stop.

The plastics industry has also urged people to take *personal responsibility* for recycling, while conveniently neglecting to mention that cities and towns – that is, local *taxpayers* – are footing the bill to collect and sort the plastic packaging waste from their products. At the same time, the plastics industry has been quietly working to **pass weak Extended Producer Responsibility (EPR) laws** that do little to reduce plastics production or limit toxic additives, and to **block container deposit laws** (or "bottle bills") that are proven to be a highly effective means of reducing litter and increasing recycling rates.

After years of earnestly promoting plastics recycling, it's time to admit that these efforts have failed. Plastics recycling does not work and will never work. *We cannot recycle our way out of the plastic pollution problem.*

2. "Chemical recycling" is not the answer

In the face of overwhelming evidence that conventional plastic recycling has failed, and in response to public pressure to do *something* to reduce the damage from plastics, the plastics and petrochemical industry has begun to aggressively promote "chemical recycling" or "advanced recycling." These are umbrella terms for a suite of technologies that attempt to turn plastics into fossil fuel or break it down into its chemical components.

In October 2024, Beyond Plastics and IPEN published a major report documenting the problems with chemical recycling: "Chemical Recycling: A Dangerous Deception: Why Chemical Recycling Won't Solve the Plastic Pollution Problem."[52] The report found that chemical recycling is more of a marketing strategy than an actual solution to the plastics problem. The track record of the 11 constructed chemical recycling plants in the United States is abysmal:

- **Failure to scale:** 3 plants are still being tested, 2 are not operating at all, and one recently closed
- **Drop in the bucket:** even at full capacity, they could process only 1.3% of U.S. plastic waste
- **Extremely expensive** to build–about $500 hundred million per plant
- **Public subsidies** are frequently needed to get the facilities off the ground
- **Difficult to supply and operate:** most cannot handle mixed plastic resins
- **Most produce fuel** to be burned, not new plastics
- **Hazardous wastes and air emissions** are by-products of these processes
- **Environmental justice communities** are often where these plants are sited

[50] "Assessing the State of Food Grade Recycled Resin in Canada & the United States." Environment and Climate Change Canada/STINA, 2021.
[51] "Plastic Wars." *Frontline*, PBS. March 31, 2020.
[52] "Chemical Recycling: A Dangerous Deception: Why Chemical Recycling Won't Solve the Plastics Pollution Problem." Beyond Plastics & International Pollutants Elimination Network (IPEN), October 2023.

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Just two weeks ago, the New York Times published an important article: "There's an Explosion of Plastic Waste. ...Big brands like Proctor & Gamble and Nestlé say a new generation of plants will help them meet environmental goals, but the technology is struggling to deliver."[53]

Pyrolysis – the most common chemical recycling process – subjects plastic wastes to intense heat and pressure, converting them into gasses, chemicals, tars, or oils.

Chemical recycling is a false solution to the plastic pollution crisis. It has failed and will continue to fail for the same real-world reasons that the conventional mechanical recycling of plastics has consistently failed. Worse yet, its emissions of toxics and greenhouse gasses could cause new harm to our environment, our climate, and the health of our most vulnerable people.[54]

C. REAL SOLUTIONS TO THE PLASTIC POLLUTION CRISIS

Despite China's 2018 National Sword policy banning imports of all but the cleanest, most uncontaminated waste plastics,[55] and despite more than 180 nations having banned or limited waste imports under the Basel Convention,[56] New Jersey has still managed to export large quantities of plastic waste. In 2023, **New Jersey exported 32 million kilograms of plastic waste** (about 70 million pounds) to India and Indonesia, ranking second in the nation for plastic waste exports behind California.[57]

I'm not trying to single out New Jersey here – other states are exporting, too – I'm informing you that a lot of plastic waste is being exported from New Jersey to nations that do not have the capacity to deal with it in a manner that we would consider acceptable from an environmental or labor standpoint.

Fortunately, New Jersey can limit those exports and implement proven solutions to plastic pollution.

1. Pass a strong refundable container deposit law aka bottle bill

Beverage container deposit laws, or bottle bills, are the original EPR – extended producer responsibility – transferring the financial burden for recycling from the taxpayer to the beverage industry.

They have a 50-year proven track record at increasing recycling *and* reducing plastic pollution. Recycling rates for deposit containers are two to three times higher than recycling rates for non-deposit containers, as the table at right shows. Containers collected through deposit systems are also cleaner and command higher market prices than containers collected through curbside recycling programs and processed at materials recovery facilities (MRFs).

U.S. Beverage Container Recycling Rates, 2018		
	Deposit	Non-deposit
PET plastic bottles	67%	17%
Aluminum cans	77%	36%
Glass bottles	66%	23%

"U.S. Nominal Recycling Rates by Deposit Status, 2018," Container Recycling Institute, 2022.

Worldwide population with Deposit-Return Systems		
	# of jurisdictions	Million people
Existing programs	62	302
Upcoming programs	7	179
Proposed programs	14	56
Total	73	536

Jurisdictions: "Global Deposit Book 2022," Reloop Platform, 2022. Population: publicly available data.

New Jersey would be in excellent company were it to adopt a bottle bill: More than 300 people worldwide now live in

[53] "There's an Explosion of Plastic Waste. Big Companies Say 'We've Got This.'" Hiroko Tabuchi, New York Times, April 5, 2024.
[54] "New NRDC 'Chemical Recycling' Analysis: Process is Harmful, Misleading, Not Solving Plastic Pollution." NRDC news release, March 7, 2022.
[55] "From Green Fence to red alert: A China timeline." *Resource Recycling*, February 13, 2018.
[56] "Countries Tried to Curb Trade in Plastic Waste. The U.S. Is Shipping More." Hiroko Tabuchi and Michael Corkery, New York Times, March 12, 2021.
[57] "U.S. Export Data: 2023 Annual Summary." Basel Action Network website, accessed April 19, 2024.

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jurisdictions with deposit laws, including 10 U.S. states, 12 Canadian provinces, 6 Australian states, and multiple countries in Europe and Asia. More than 200 million people live in jurisdictions that have proposed or planned deposit programs.

A strong bottle bill would:

a. **place refundable deposits on most beverages,** including wine and liquor .
b. **have a minimum 10-cent deposit** with a mechanism to increase the deposit value should redemption rates fail to meet recycling targets in the specified time period.
c. **require mandatory return-to-retail redemption:** the most convenient way for consumers to redeem their bottles and cans. Redemption centers or depots should be used as supplements but not substitutes. These facilities are especially important in neighborhoods that do not have supermarkets. And they create jobs.
d. **get serious about waste reduction:** require that 25% of beverage containers be sold in refillable containers by 2030. Coke has announced that they will do that, and it's time to put that Coke committment into law.

2. Pass a strong packaging reduction and recycling bill, aka EPR

The smartest and most economical way to stem the tide of plastic waste is to focus on reduction. Most companies will not stop over-packaging their products unless they are required by law to do so. Extended producer responsibility, or EPR, is a policy tool that makes producers legally and financially responsible for mitigating the end-of-life impacts of their products and packaging. It's a strategy used around the world, and is gaining in popularity in the United States; four states have adopted EPR laws in the last several years – albeit with some with significant shortcomings. These programs can be a vital part of the solution to the packaging waste and plastic pollution crisis–*but only if designed correctly.* To be effective, we recommend that any packaging reduction legislation include the following pillars:[58]

1) **Establish environmental standards for packaging in statute** – similar to fuel efficiency standards for cars or appliance efficiency standards;
   a) 50% packaging reduction within 10 years, through reduction or reuse/refill systems
   b) 70% recycling rate within 12 years for the remaining materials

2) **Reduce toxics.** Remove some of the worst toxic chemicals and substances from packaging, such as PFAS, polyvinyl chloride, formaldehyde, styrene, mercury, and lead.

3) **Exclude chemical recycling from the definition of "recycling."** These facilities are primarily producing fuel to be burned, and are often placed in environmental justice communities. These technologies should not be considered recycling.

4) **Provide financial relief to taxpayers and consumers** by requiring packaging companies to pay fees that are used to
   a) **reimburse municipalities** for the cost of refilling or recycling packaging material
   b) **fund new reduction projects** and improved recycling projects
   c) **fund state agencies** for managing the program and enforcing the law.
   d) **Exempt refillable and reusable packaging** from fee payment

5) **Include commercial waste in the program,** because it makes up 40% - 60% of the waste stream.

[58] "Ten Requirements for Effective Packaging Reduction Policies." Beyond Plastics and Just Zero, 2022.

6) **Put state agencies in charge of the system.** Just as we don't expect the tobacco industry to promote smoking cessation, we should not allow consumer brands to self-regulate through Producer Responsibility Organizations (PROs). Agencies should have strong oversight and enforcement of performance targets, including the ability to disband poor-performing PROs.

7) **Ensure strong oversight and accountability.** A law is only as strong as its enforcement. Create a new Office of the Inspector General in the Attorney General's Office, specifically to enforce the program, funded by the PRO.

8) **Avoid glaring loopholes:** the bill language should not allow packaging producers to wiggle out of compliance. For instance, Section 42060(3)(A) of the California EPR law exempts "single-use material that presents unique challenges in complying." This provision alone could make California's new EPR law ineffective.

THE TIME TO ACT IS THIS YEAR

The data is clear. The crisis is real. The time to act is now.

Your constituents are paying attention to this issue, and they are looking for leadership. A nationwide Ipsos poll found that 81% of American voters support local, state, and national policies that reduce single-use plastic. This support is bipartisan.[59]

The New Jersey legislature needs to make this a priority and find the political will to act. Every day of delay deepens the intertwined problems of plastic pollution, health damage, climate change, and environmental injustice – making them more difficult and costly to fix.

In the ten minutes I've spent testifying today, the equivalent of ten to twenty garbage trucks full of plastic waste have entered the ocean around the world. Much of that plastic was originally made in the United States. We're already flooding the world with plastic, and the plastics industry wants to crank up production and open the taps even wider.

We call on you to take action to keep us all from drowning in this flood.

[59] "8 in 10 American Voters Support a National Policy Reducing Single-Use Plastic," Oceana, accessed Dec. 11, 2022.

PLASTICS
INDUSTRY ASSOCIATION

April 19, 2024

New Jersey Senate Environment and Energy Committee
New Jersey Assembly Environment, Natural Resources, and Solid Waste Committee
State House Annex
Trenton, NJ 08608

Re: Joint committee meeting on the issue of plastics pollution in New Jersey

Dear Chairs Smith and Kennedy, Vice Chairs, and Esteemed Members of the Committees,

The Plastics Industry Association (PLASTICS) respectfully offers our comments in relation to the hearing taking place between your committees to discuss plastic pollution in the State, and methods that may be used to protect against plastics from entering the natural environment. As the only association that represents the entirety of the plastics manufacturing chain, with nearly 1 million jobs across the country, we have a vested interest in any proceedings taking place regarding plastics that offers an opportunity to provide insight into how industry, policy makers, and the public can work together to create a more circular economy in order to ensure plastic waste does not end up in our waterways and ecosystems.

We urge policy makers to invest in recycling and recycling infrastructure. The answer is not to ban plastic. Plastic is continuously proven to be the most environmentally friendly material compared to its packaging alternatives in every life cycle analysis ever completed. They conserve the most energy, water, and carbon across all points of their life cycles. Additionally, a world without plastic is impossible to imagine. Plastics are the most chosen material across industries such as the automotive, medical, and food industries because they are the most sustainable choice. They touch every aspect of our daily lives, providing safety and economic benefits to consumers and citizens. Recycling fosters a culture of sustainability and responsible consumption. It helps individuals and communities to minimize their overall ecological footprint- all while keeping plastics out of our environments and contained within a closed loop system where they can be recycled time and time again. This is how waste can and will be significantly reduced and our environment preserved.

PLASTICS is committed to sustainability, and we work with our members to help them achieve their own goals daily. Industry continually implements sustainable materials management strategies and promotes concepts and initiatives that consider the entire lifecycle of a product, the use of increased amounts of recycled content in products, and practices that mitigate resin loss. For example, in 1991, PLASTICS created Operation Clean Sweep (OCS), a program that empowers companies to achieve zero plastic resin loss in the environment. Currently, OCS is operated in over 60 countries, with hundreds of companies and over 1,000 facilities operating right here in the United States, including multiple sites in New Jersey specifically. Further, our industry has invested upwards of $8 billion dollars towards recycling initiatives, infrastructure, and advancements in recycling technology, and continues to invest more money every year. But we can't solve these problems alone. We need the support of policymakers to help educate the public,

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help these incredibly important investments come to fruition, and champion the benefits of recycling alongside us.

Thank you for the opportunity to submit our comments on this important issue. PLASTICS advocates for the responsible recycling, reuse, and recovery of all plastics products, and we welcome any opportunity to continue working with policymakers and stakeholders to help create a truly circular economy and implement successful change. Please do not hesitate to reach out for further information or with any clarifying questions.

Sincerely,

Danielle Fortunato
Regional Director, State Government Affairs
Plastics Industry Association
dfortunato@plasticsindustry.org

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PLASTICS INDUSTRY ASSOCIATION

RECYCLING IS REAL

Plastics: The Sustainable Choice

Industries across the economy choose plastics as a sustainable choice because they are **lightweight, durable, versatile and the most resource-efficient option available.** Though critics tend to be more in favor of alternatives like glass, metal and wood, studies prove that **plastics should be a go-to** for consumers and companies alike seeking to conserve energy, water and carbon.

Plastics conserve energy at all points in the product life cycle.

A standard plastic straw uses **substantially less energy** during production than paper.

Substituting plastic packaging with alternative materials can **increase transportation energy** usage.

At **end-of-life**, recycling one pound of plastic requires far less energy than recycling one pound of paper.

All of this means savings for business and consumers.

Plastics conserve water in a variety of consumer-based and industrial applications.

Drip irrigation systems made from polyethylene and soaker hoses made from polyvinyl chloride (PVC) **increase water efficiency** in backyards and agricultural areas.

Plastic piping can help reduce the 850 broken pipe incidents that occur daily.

Plastic pool covers prevent up to 95% of pool water evaporation, saving thousands of gallons of water that float into the sky every month.

Plastics conserve carbon across the economy.

Replacing all plastic bottles with glass would create carbon emissions equivalent to the amount produced by 22 coal-fired power plants.

Airplanes made with plastic use less fuel than those with fewer plastic parts.

Plastics make cars lighter, conserving fuel and lowering emissions.

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Beyond the Bottle

PLASTICS INDUSTRY ASSOCIATION

Recycled Plastic Bottles Find New Life as Consumer Products

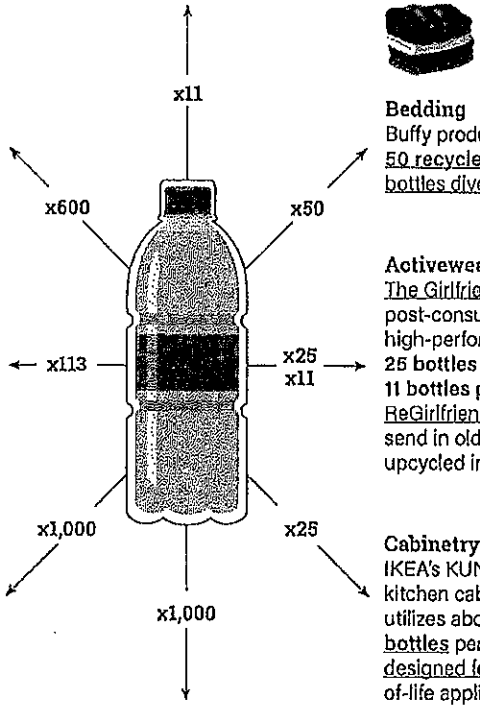
Plastic bottles are containers for many perishable products, but their value extends far beyond single-use. A by environmental scientist Ken Green found that plastic is more environmentally friendly across its lifecycle, in terms of water and energy usage and carbon emissions, than alternatives.

Footwear
Companies like Adidas transform plastic bottles recovered from the ocean into sneakers, using about **11 bottles per pair.**

Tables
Mexican company Luken, which exports its products to the U.S. is one of many furniture companies relying on recycled plastic, fashioning side tables and children's tables and chairs from 600 recycled plastic bottles per piece.

Couches
Furniture retailer Lovesac uses about 113 recycled plastic bottles in each of its sleek, modern, plastic-based sectionals, helping build a circular economy by removing 25 million plastic bottles from the wastestream in 2020 alone.

Rugs
Pottery Barn crafts indoor/outdoor rugs from up to 1,000 recycled plastic bottles per rug as part of a recycled plastics product line aimed at reducing waste and increasing material circularity.



Bedding
Buffy produces its 'Cloud Comforter' using about 50 recycled plastic bottles, totaling 4 million bottles diverted from landfills in 2020 alone.

Activewear
The Girlfriend Collective turns recycled post-consumer plastic bottles into high-performance activewear, using **25 bottles** per pair of leggings and **11 bottles** per athletic crop top. Its ReGirlfriend program also allows customers to send in old or damaged company clothing to be upcycled into new clothing items.

Cabinetry
IKEA's KUNGSBACKA line of kitchen cabinet and drawer fronts utilizes about 25 recycled plastic bottles per front. The KUNGSBACKA line is designed for easy recycling, ensuring multiple end-of-life applications and promoting circularity.

Workspaces
Office space innovator ROOM creates portable, soundproof private meeting spaces that incorporate over 1,000 plastic bottles per room. A lifecycle analysis found these rooms can **cut organizations' cumulative carbon emissions by** 33 percent over 10 years, demonstrating recycled plastics' sustainability benefits beyond reducing waste.

Plastics are key to creating a more circular future

The recovery and remanufacture of plastic products unlock the material's full potential and value. From roads to jet fuel to skyscrapers and more, the years to come are ripe with opportunities to create more innovative, sustainable end markets for post-consumer plastics. Alongside sustained support for mechanical recycling infrastructure, policymakers must support new technologies, like advanced or molecular recycling, capable of creating nearly 40,000 domestic jobs to maximize recovery and minimize waste.

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ThisIsPlastics.com

Advanced Recycling: Reducing Plastic Waste, Cutting Emissions, Growing Economies

Plastics are highly valuable materials that play an important role in the modern economy. Plastics provide sustainability benefits versus alternative materials and will continue to play an important role in helping society mitigate greenhouse gas emissions.

As we move toward a circular economy, there is greater demand to increase plastic recycling as well as recycled content in products. **Advanced recycling is a necessary and essential complement** to mechanical recycling to ensure that plastics stay **out of the environment**, while also creating **new products** and **economic growth** opportunities that benefit society.

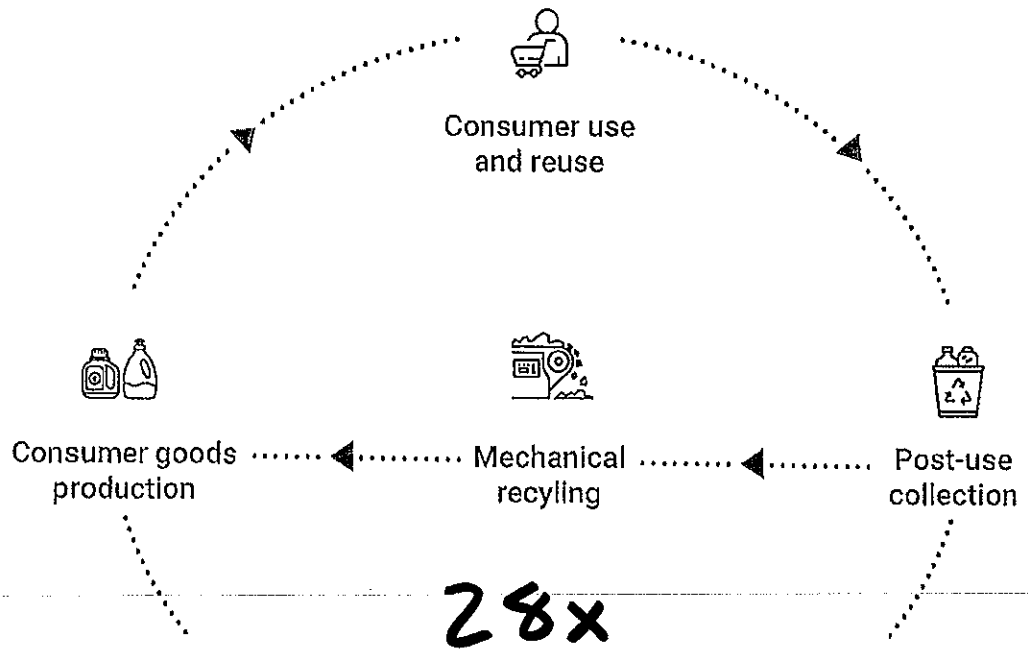
What is Advanced Recycling?

Advanced recycling, also known as chemical, molecular, tertiary or feedstock recycling, encompasses any technology that converts plastics into a purified form or a feedstock that can be used in the production of new polymers, monomers, intermediates, or other materials. Examples include but are not limited to purification, depolymerization, solvolysis, gasification, and pyrolysis.

How does Advanced Recycling work?

While mechanical recycling uses physical processes such as grinding, washing, separating, and compounding in which polymers remain intact, advanced recycling typically alters the chemical structure of plastics, by methods such as dissolving with chemicals or using heat to break them down into original components. Advanced recycling produces materials that are indistinguishable from virgin plastic so they can be used to make a wide range of new products.

Advanced recycling is typically broken down into three general categories: purification, depolymerization, and conversion.



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RECYCLING IS REAL

The plastics industry believes we need to recycle more. We all need to work together to increase our recycling rates.

The Recycling is Real campaign is dedicated to promoting plastic recycling in America.

The Recycling is Real initiative has featured recycling taking place in states across the U.S. including California, North Carolina, Ohio, New York and Louisiana, and there are countless examples of recycling taking place across the country.

Unfortunately, there are organizations promoting the false narrative that recycling is not happening or is a "myth." Nothing could be farther from the truth and the plastics industry has worked to show where it happens, when it happens and the hardworking people who do it every day accross America.

Recycling is both feasible and economical, and every year the plastics recycling industry reprocesses over 6 billion pounds of plastic.

The Plastics Industry is committed to sustainability and ensuring plastic material remains in our circular economy and out of the environment.

Tens of thousands of Americans go to work every day in the recycling industry and related industries, including manufacturing and waste management.

Recycling reduces waste, diverts refuse otherwise headed for landfills, conserves resources, and minimizes environmental impacts.

Recycled plastic can be repurposed into any product imaginable including bike helmets, plastic water bottles, clothing, decking, packaging, automobile components, furniture, building materials, and more.

To reach our sustainability goals, we must invest in the improvements and modernization of our country's recycling infrastructure.

The Plastics Industry Association stands ready to work together with stakeholders at the federal and state level to find real solutions to recycle more plastic every day.

LEARN MORE ABOUT RECYCLING IS REAL

RECYCLING IS REAL

PLASTICS INDUSTRY ASSOCIATION

Plastics Industry Association | 1425 K St. NW, Suite 500, Washington, DC 20005 | (202) 974-5200 | plastics@plasticsindustry.org

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TEKNIPLEX
Consumer Products

April 19, 2024

George Braddon
Tekni-Plex
26 Maple Ave.
Bloomfield NY 14469
585-261-8180

NJ recycled content
NJ Department of Environmental Protection

Dear NJDEP,

Tekni-Plex is introducing a new thermoformed lidded cup, made from clear polypropylene, which meets the definition of a beverage container. The product will be sold nationwide. There are several states that require recycled content for beverage containers so we will be adding recycled polypropylene. The recycled content will originate from chemical recycling which does not meet the requirements in NJ as outlined in the FAQs.

We have not been able to source clear polypropylene from a mechanical recycling process that meets FDA requirements and that is the reason that we are sourcing the PCR from a chemical recycling process.

Respectfully,

George Braddon
VP, Government Affairs

30x