Opportunities for Reducing the Use of Single-Use Plastics at Brookhaven National Lab.

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Plastics Pollution...Cause for Concern

Topics:
- Background
- Define the Problem
- BNL’s Plan
Background
The first plastic was originally created in the late 1800’s.

1950’s Modern mass production of plastics begins.

What is Plastic?

Long chain polymer not created by nature.

plastic

NOUN

1. a synthetic material made from a wide range of organic polymers such as polyethylene, PVC, nylon, etc., that can be molded into shape while soft and then set into a rigid or slightly elastic form:
"bottles can be made from a variety of plastics"
Define the Problem

According to the EPA, about 300 million tons of plastic gets disposed of each year. Only about 9% gets recycled leaving 273 million tons getting landfilled or incinerated where they may take tens to hundreds of years to decompose. (Actual lifetime of various plastics is not well understood)

Half of those plastics are single-use plastics.
Litter...and its Impact

Microplastics Abundance in Eastern Tropical Pacific

Number of microplastics per cubic meter (Nm³)

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2020</th>
<th>2030</th>
<th>2050</th>
<th>2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>41.28</td>
<td>113.9</td>
<td>180.0</td>
<td>254.1</td>
<td>520.1</td>
</tr>
</tbody>
</table>

Forecast

Microplastics

A 2019 joint study by Dalberg and the University of Newcastle in Australia has revealed the extent of humans ingesting microplastics in every meal we eat.

Recent studies have revealed the extent of how much plastic we are ingesting. A pilot study which took place in Norway in 2018 found...
Overall Use Of Plastic (Europe)

- **Packaging**: 44%
- **Building & Construction**: 18%
- **Automotive**: 8%
- **Electrical & Electronic**: 7%
- **Household, Leisure & Sports**: 7%
- **Agriculture**: 4%
- **Others**: 12%

**Use of Plastic**
Major users of plastic in the 27 EU member states plus Norway, Switzerland and the United Kingdom per sector in 2021.
*Others include appliances, mechanical engineering, furniture, medical, etc.*
What’s on the Beaches? (Europe)

www.citytosea.org.uk/top-10-single-use-plastic-items-on-seashores/

Where should BNL focus its efforts?

The Single-Use Plastic Most Found on Our Beaches

Beach clean data from across the UK (collected by the incredible Marine Conservation Society and their army of volunteers), Europe and from around the world reveals the same patterns and the same items cropping up time and time again.

1. Plastic Bottles and Lids
2. Cigarette Butts
3. Cotton Bud Sticks
4. Crisp Packets and Sweet Wrappers
5. Period Products
6. Plastic Bags
7. Plastic Cutlery and Straws
8. Coffee Cups and Drinks Containers
9. Balloons
10. Food Containers and Fast Food Packaging

Single-use plastic products such as plastic cutlery, drink bottles, food wrappers and cigarette butts make up almost half of all sea litter! Flushed plastic such as wet wipes, menstrual products and cotton buds are also a massive issue. We’re literally flushing the health of our oceans down the pan. Read more about Unflushables and how to be a good steward.
Define the Problem
Federal Response

Acquisitions – purchasing
requirements addressed:

• Energy & water efficiency
• Biobased products
• Non-ozone depleting products
• Recycled content
• Less toxic alternative products
• Phasing out use of single use plastics.

NEW!!

Waste Reduction

Net ZERO

Waste Diversion from Landfills

In terms of:
• Carbon emissions
• Tons of Waste Landfilled (vs Energy Recovery)
Acquisitions & Procurement - Performance

GREENBUY PROGRAM

Fiscal Year 2022
Brookhaven National Laboratory
Is recognized for achieving Gold leadership level goals in Sustainable Acquisition of
15 products in 6 different categories

Ingrid Kolb
Chief Sustainability Officer

Digitally signed by Ingrid Kolb
Date: 2023.04.14 17:11:48 -0400

GreenBuy Superior
Awarded for earning GreenBuy Gold seven times

Brookhaven National Laboratory
Office of Science

2022 Gold 15 products/6 categories
2021 Gold 18 products/7 categories
2020 Gold 13 products/6 categories
2019 Gold 11 products/7 categories
2018 Gold 12 products/7 categories
2016 Gold 14 products/7 categories
2015 Gold 11 products/7 categories
BNL Waste Stream

2015 Dumpster Dive

Inventoried the contents of dumpsters from:
• Building 510 (Physics)
• Building 400 (Research Support Building)
• Building 460 (Director’s Office)

All mostly administrative offices and desk work.
Other BNL Sources of Single Use Plastics

- Packaging: 44% - YES
- Building & Construction: 18% - YES
- Automotive: 8% - NO
- Electrical & Electronic: 7% - NO
- Household, Leisure & Sports: 7% - SOME
- Agriculture: 4% - SOME
- Others*: 12% - YES
Why Not Expand Recycling Options?

Lots of research in this area – hopefully, recycling options expand in the future.

Recycling is more expensive than making virgin plastic...

Flexible plastics (bags) clog recycling equipment

...and the quality of the reclaimed plastic isn’t as good.
BNL’s Plan
BNL Action

Current Efforts:

• Adding water bottle fills to existing drinking fountains.
• Educate staff (Listening Session).
  • Feedback: better define the problem.
• Research into available reduction options in laboratories.

Near Term Efforts:

• Negotiate no use of single use plastic utensils and dishware on any future cafeteria contract.
• “Garbage Free Lunch” display in BERA Store.
• Reach out to work with scientists directly to establish pilot reduction programs.
• Future “dumpster dives” this year.
Opportunities to Reduce Single Use Plastics in Laboratories

- Pipette Tip Cleaning
- Pipette Repair
- Use of Biobased Pipettes
- Plate Washers
- Chilled Sample Cooler Return/Reuse
- Return to use of glassware

https://www.eppendorf.com/

https://ionfieldsystems.com/
Hope for the Future......

Plastic waste is an issue now, but there’s hope for better management in the future.

Just remember the story of coal.

Trees (cellulose) were once new to this world too with no microbes capable of biodegrading it. Until, one day, they learned how.

That’s why, today, there is a layer of coal around the world that represents the period that those cellulose-eating microbes didn’t exist. And that’s also why there is only one layer of coal.

Science Magazine, 3-11-16. Isolation of novel bacterium, Ideonella sakaiensis 201-F6, that can degrade PET plastic in approximately 6 weeks @ 30 °C. Plastic Eating Bacteria - how they work - PETase that can break down plastic (rsscience.com)
BNL Is Working On It…

We will continue working with the enthusiastic group from the listening session to evaluate options for reduction.

We’d be happy to update the CAC in the future on progress.