A REVIEW OF ENVIRONMENTALLY PREFERABLE PURCHASING AND SELECT EXPERIENCES: MIDWEST AND BEYOND

EPA SMM Web Academy
David R. Shonnard
Michigan Technological University
August 13, 2020

Outline

- Introduce EPA's Environmentally Preferable Purchasing (EPP) Program
- Introduction to plastics, plastic waste, and benefits of recycling
- Objectives of the EPA R5 EPP project
- Summary of study methods and key results
- Future developments in chemical recycling to increase recycling rates
- Guest panelist presentations
- Panel discussion with Q&A

Introduction to EPA's EPP

Federal Procurement

EPP Program helps federal procurement officials to identify and purchase products that prevents pollution and have lower life cycle costs.

EPP

Assists purchasers to understand the many environmental standards and product ecolabels

Private Sector

Support domestic manufacturing and US industry competitiveness

Standards, Ecolabels

Additional Information

- US EPA's Environmentally Preferable Purchasing Program.
  https://www.epa.gov/greenerproducts/about-environmentally-preferable-purchasing-program

- US EPA's Comprehensive Procurement Guideline (CPG) Program.
  https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program#add

- US EPA's Recommendations of Specifications, Standards, and Ecolabels.
  https://www.epa.gov/greenerproducts/recommendations-specifications-standards-and-ecolabels-federal-purchasing

- US EPA at 50: Increasing Recycling Across the Nation
  https://www.epa.gov/newsreleases/epa-50-improving-and-increasing-recycling-across-nation-preserve-resources-and-land

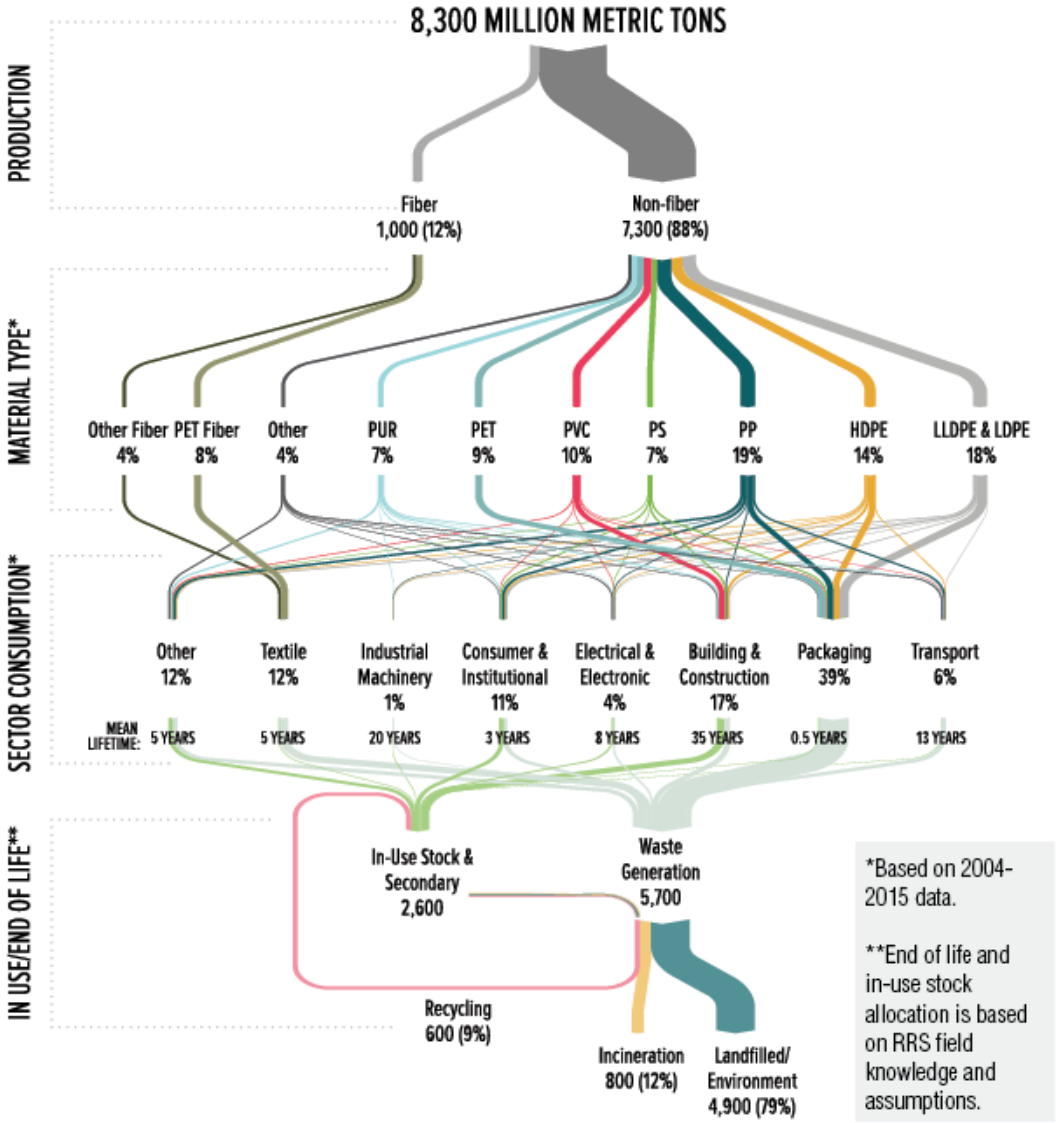
CUMULATIVE GLOBAL PLASTICS PRODUCTION / USE DATA

Production/Use

- 4% of petroleum (feedstocks)
- 4% of petroleum (process energy)
- Additional inputs in Natural Gas
- Non-fiber plastics (88%)
- Packaging (39%) is largest sector (PE, PP, PET) with the shortest in-use lifetime (<1 yr)

End of Life

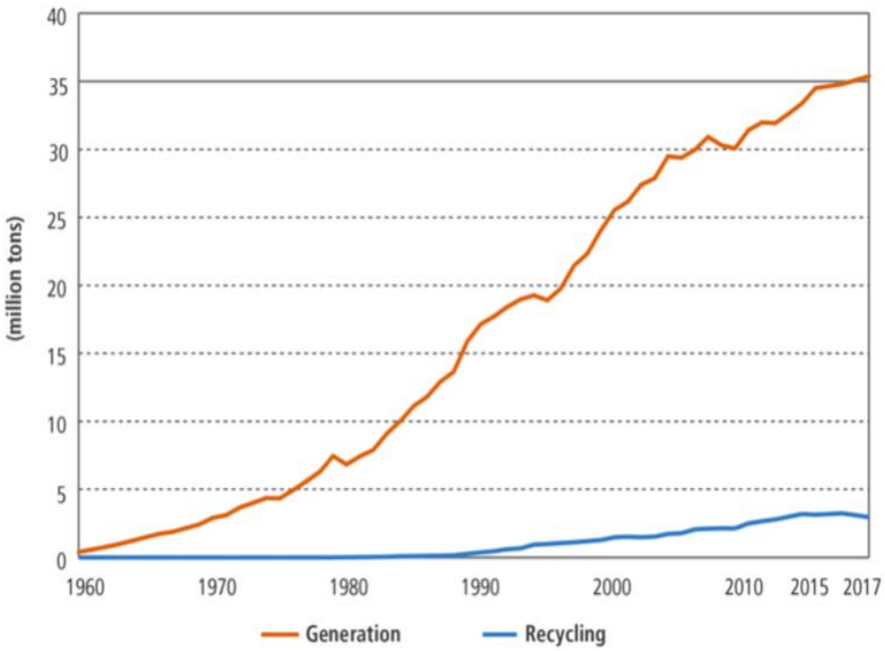
- Landfilling (79%)
- Incineration (12%)
- Recycled (9%)
- Ocean debris: 8 million tons/yr



Introduction

- Plastic waste generation in the US has been increasing during 1960-2017 period
- Whereas, the amount of plastics recycling had not met the current generation potentials
- Chinese regulations now limited plastic imports to a 0.5% maximum contamination level which lead to stockpiling or landfilling material
- 75.8% of plastics in MSW are landfilled in 2017

US Plastic Waste Generation

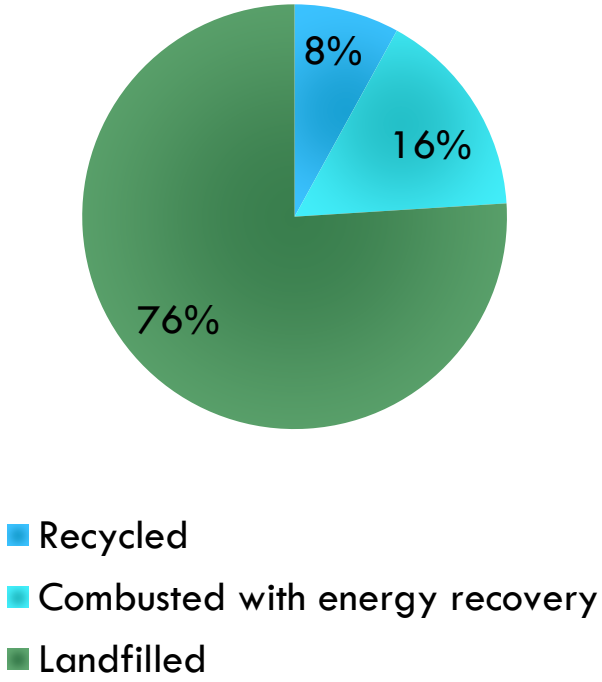


https://www.epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf

Introduction

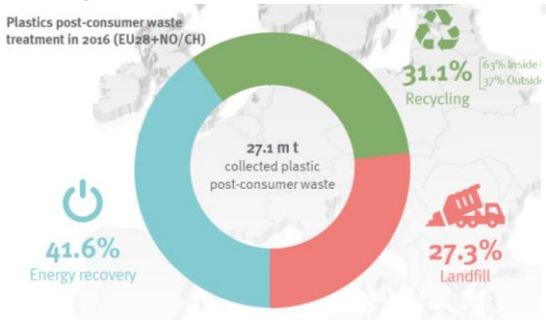
US Plastic Waste Generation and End-of-Life Treatments

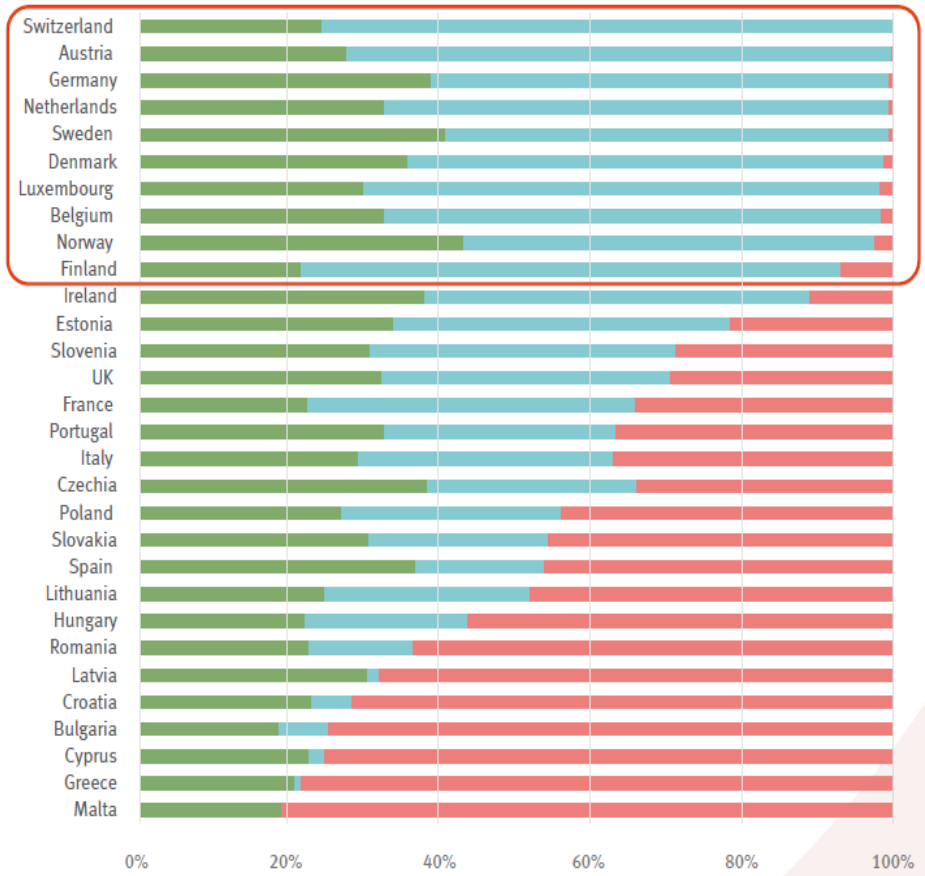
- In 2017 the total plastics generated is 35.4 million tons
- Only 8% is recycled and 16% is combusted
- At 76%, the higher of generated plastics is landfilled



Introduction

EUROPEAN UNION PLASTICS DATA





Plastic post-consumer waste rates of recycling energy recovery and landfill per country in 2016

- Recycling
- Energy Recovery
- Landfill
- Countries with landfill restriction implemented

Plastics Europe: Plastics-the Facts 2017: An analysis of European plastics production, demand, and waste data

Introduction

	Generation	Recycled
PET	5010	910
HDPE	6150	580
LDPE/LLDPE	8080	340
PP	8000	50

The numbers in the table are in thousand tons and the statistics represents 2017 data on Plastics

- Among all the product categories % of plastics recycled is greater for PET i.e. 18.2%
- HDPE products are more recycled compared to LDPE products with 9.4 and 4.2 % respectively
- PP category is the least recycled with 0.6%

Benefits of Recycling Materials

A literature review was conducted to explore how the benefits of material recycling can be determined through environmental **life cycle assessment** (LCA)

- Reduces the consumption of natural resources

- Decreases energy intensity and GHG emissions
- PET: **Virgin** (2.75 kg CO_2 eq/kg); **Recycled** (1.18 kg CO_2 eq/kg)
- HDPE: **Virgin** (1.82 kg CO_2 eq/kg); **Recycled** (0.63 kg CO_2 eq/kg)

- Greenhouse gas savings
- **Paper**: 91%, **Aluminum**: 95%, **Glass**: 44%, **Steel**: 65%

Objectives of the Project

1) Identify environmentally preferable purchasing (EPP) policies, practices, and other opportunities to increase recovery and reuse of plastic materials such as polyethylene in plastic bags and film, with a focus on Region 5

2) Identify opportunities to educate procurement officials and others about managing end-of-life processes for lithium batteries.

Tasks in the Project

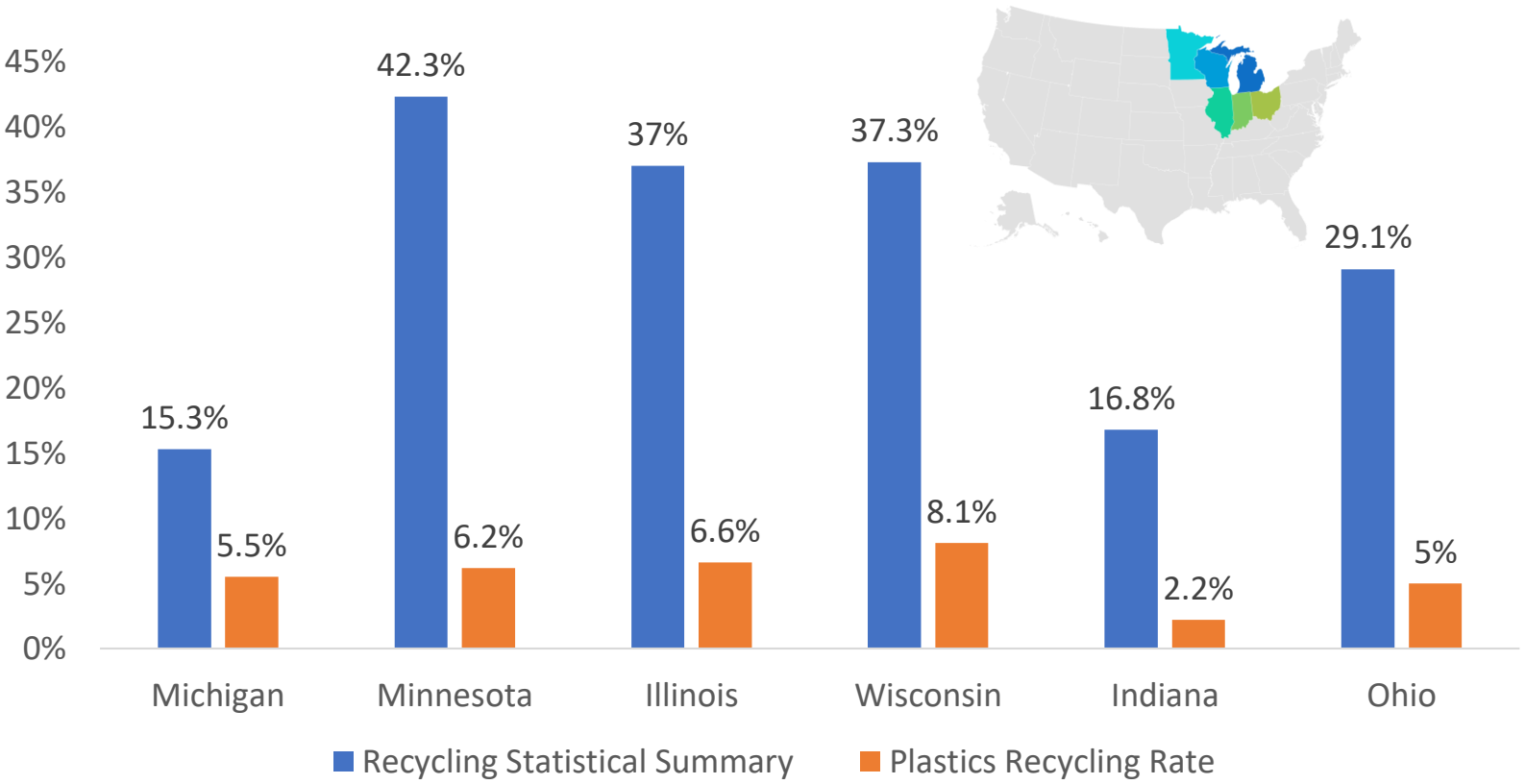
Task 1: Identify recycling rates, policies, and programs, mainly in EPA Region 5

Task 2: Analyze EPP policies and programs and prepare for conducting an anonymous survey on identified policies, challenges and best practices with no more than 9 selected purchasing professionals from state and city government as well as private industry

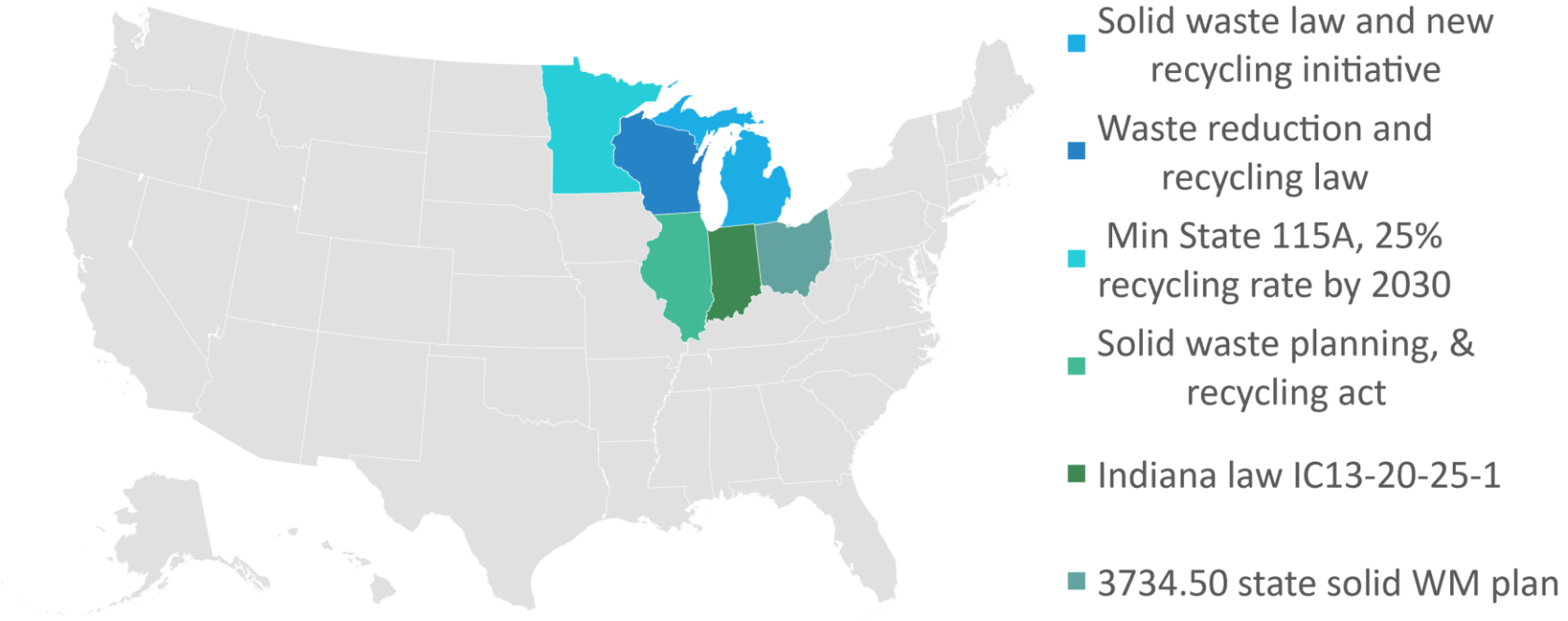
Task 3: Based on the survey, summarize best practices that procurement professionals use to purchase products with recycled content

Task 4: Investigate how end-of-life (EOL) management of lithium ion batteries (LIBs) could be addressed and identify LIB recycling companies in Region 5 and other states

Task 1: Recycling Rates in Region 5



Task 1: Region 5 Recycling Policies and Initiatives



There is broad range of EPP policies and goals among the surveyed entities, yet there is also a good deal of overlap. This suggests that some efforts to share experiences could be beneficial, which may lead to efforts for standardization in the future.

Task 2: Characteristics of EPP

- Minimum packaging material
- Use of recyclable/recycled material in packaging
- Energy and water efficient products or services
- Use of no/fewer toxic chemicals/materials
- Less greenhouse gas (GHG) emissions
- Derived from renewable energy/materials, and
- Offering environmental, economic or social benefits

Task 2: Challenges in Implementing EPP

- Decentralized purchasing systems by federal and state governments
- Difficulty in estimating the life cycle costs and/or environmental impacts of products
- Tracking environmentally preferable products
- Finding new suppliers to procure such products
- Shifting from a “business as usual” scenario
- Avoiding greenwashing claims

Task 3: Survey Details

- Survey was conducted in Region 5 states, some states in Region 9 and a private company
- Region 5 states include Michigan, Illinois, Ohio, Minnesota, Wisconsin, Indiana
- States in Region 9 that participated in the survey include California and City of Phoenix, AZ
- Survey was conducted via email which included:

i. A word document with questions

ii. A link to Google form to submit responses

- Maintained anonymity of the interviewee

Task 3: Survey Questions

Question Number	Category
1-3	EPP policies
4-6	EPP goals and targets
7-9	Plastic specific EPP policies
10-11	Lithium Ion Battery (LIB)-specific EPP policies
12	Evaluating effectiveness of EPP program
13	Challenges before and after EPP program
14	Consideration of environmental performance in purchasing decisions
15	Implementation of best practices in EPP
16-17	Deciding and prioritizing EPP products based on standards, labels, certifications etc.
18	Overcoming challenges in EPP

- 18 questions in total
- 3 multiple choice questions
- 15 requiring a narrative answer

Different EPP policies across Region 5, CA, SOP

EPP policies	INTERVIEWEES						
	R5S-1	WI	MN	IL	CAS	SOP	Other
Targets for % purchase of environmentally preferable products or services							
Price preference for environmentally preferable products							
Specific fund pool for environmentally preferable products							
Market directory or clearinghouse for recycled materials, etc.							
Life cycle cost of products or total cost of ownership (TCO) or whole life cost or best value purchasing							
List of all green suppliers to purchase from							
List of all green products to purchase							

* SOP - City of Phoenix, AZ * Other - Private Company

Different EPP goals across Region 5 and Region 9 states

EPP Goals	INTERVIEWEES						
	R5S-1	WI	MN	IL	CA	SOP	Other
Lower environmental impacts through purchasing							
Encourage and sustain markets for products made from recycled materials							
Encourage local or domestic production of goods and services							
Reducing adverse impacts on health, social conditions and the environment							
Support businesses owned by under-represented groups							

* SOP - City of Phoenix, AZ * Other - Private Company

Environmental performance in purchasing decisions across Region 5 and Region 9 states

Weightage of environmental performance in purchasing decisions	INTERVIEWEES						
	R5S-1	WI	MN	IL	CA	SOP	Other
Equal to cost and function							
Greater than cost and function							
Less than cost and function							
Other comments							

* SOP - City of Phoenix, AZ * Other - Private Company

Major findings

- EPP policies are often linked to other policies and programs by prioritizing them.

State	EPP Policies linked to
CA	Legislation (AB262, SABRC) mandating GHG reductions and purchase of products with recycled content
MN	Executive Order
City of Phoenix	Voluntary

- **EPP Training**:

  - A wide range in responses were given to whether formalized EPP training is available for procurement officers.
  - About **half** of the respondents stated that there are either no training programs or they are being developed, while
  - The remainder indicated that procurement personnel have access to either in-house training programs or training provided by outside organizations.

Major findings

- **Identify EPP Products**: Regarding the question of how procurement officers identify EPP products to purchase,
  - many respondents indicated they use of accepted guidelines (EPA Comprehensive Procurement Guideline (**CPG**) program, Sustainable Purchasing Leadership Council (**SPLC**))
  - standards, and ecolabels, https://www.epa.gov/greenerproducts/recommendations-specifications-standards-and-ecolabels-federal-purchasing
  - while others indicated third party certification to verify emission reduction compliance with the law and regulations.
  - Others still stated a reliance on vendor self-certification or
  - not using guidelines, ecolabels, and standards

Major findings

- What **changes to EPP policies** would make them better:
  - A range of answers were provided;
  - Require that all state purchasing be through EPP contracts,
  - Mandate purchase of products with recycled plastic content,
  - Emphasizing vendor reporting in purchasing decisions,
  - Improve enforceability of EPP policies,
  - Setting mandatory targets for purchase of products with recycled content, and
  - Hiring a full-time person to implement a mandatory EPP program

Acknowledgements

- Prathyusha Sreedhara, MS Candidate, Department of Computer Science, Michigan Technological University
- Utkarsh Chaudhari, PhD Candidate, Department of Chemical Engineering, Michigan Technological University
- Dr. Ulises Gracida-Alvarez, postdoctoral researcher, Sustainable Futures Institute, Michigan Technological University (now at Argonne National Lab)

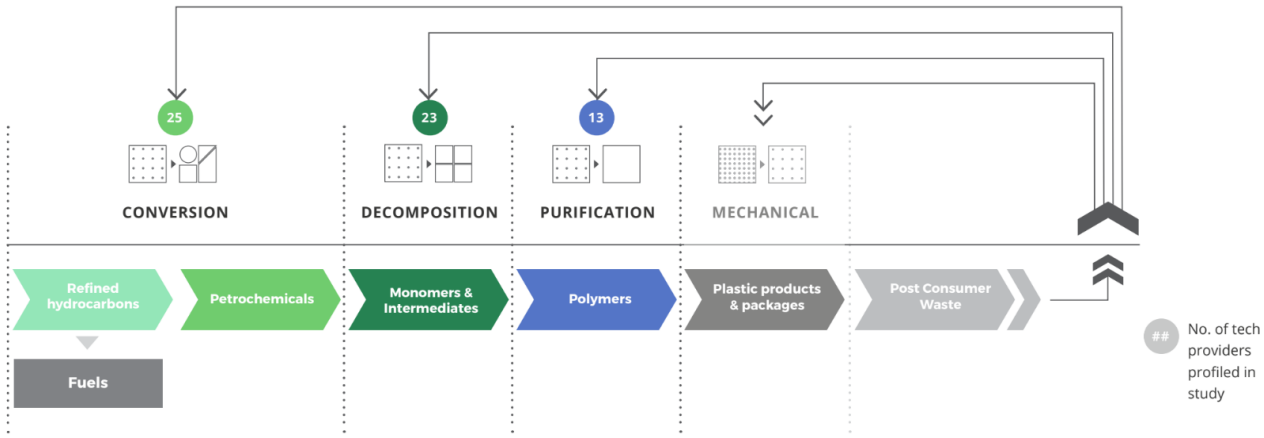
Final Thoughts on Increasing Plastics Recycling

Mechanical Recycling limitations

1. Contamination from additives and pigments
2. Mechanical strength less than virgin resin
3. Resin from mechanical recycling is blended with virgin resin

Chemical Recycling advantages

1. Virgin quality resin is possible
2. Many process options for different plastics



Conversion: a thermal process involving breaking bonds in the polymer to produce liquid and gaseous products such as fuels and petrochemicals.

Decomposition: a biological, chemical, or thermal process involving selective breaking of bonds in the polymer to produce monomers.

Purification: a process involving dissolving plastics in solvents to remove pigments and additives prior to separating pure resin.

https://www.closedlooppartners.com/wp-content/uploads/2020/01/CLP_Circular_Supply_Chains_for_Plastics.pdf

Thank You

David Shonnard, Ph.D.
Professor and Richard and Bonnie Robbins Endowed Chair
Department of Chemical Engineering
Director: Sustainable Futures Institute

drshonna@mtu.edu

Why the world has a plastic waste problem, and how to fix it
https://www.cnbc.com/video/2020/08/08/the-search-for-plastics-alternatives.html