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

EPA SMM Web Academy
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Michigan Technological University
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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

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

Support domestic manufacturing and US industry competitiveness

Assists purchasers to understand the many environmental standards and product ecolabels
➢ 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 at 50: Increasing Recycling Across the Nation
**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

© 2017 RRS. Visit recycle.com to learn more about Ann Arbor, Mich.-based RRS.
Plastic waste generation in the US has been increasing during the 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 landfiling material. 75.8% of plastics in MSW are landfilled in 2017.

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

<table>
<thead>
<tr>
<th>Material</th>
<th>Generation</th>
<th>Recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td>5010</td>
<td>910</td>
</tr>
<tr>
<td>HDPE</td>
<td>6150</td>
<td>580</td>
</tr>
<tr>
<td>LDPE/LLDPE</td>
<td>8080</td>
<td>340</td>
</tr>
<tr>
<td>PP</td>
<td>8000</td>
<td>50</td>
</tr>
</tbody>
</table>

- 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%
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 CO₂ eq/kg); Recycled (1.18 kg CO₂ eq/kg)
  - HDPE: Virgin (1.82 kg CO₂ eq/kg); Recycled (0.63 kg CO₂ 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

Recycling Statistical Summary

Michigan: 15.3%
Minnesota: 42.3%
Illinois: 37%
Wisconsin: 37.3%
Indiana: 16.8%
Ohio: 29.1%

Plastics Recycling Rate

Michigan: 5.5%
Minnesota: 6.2%
Illinois: 6.6%
Wisconsin: 8.1%
Indiana: 2.2%
Ohio: 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

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

- 18 questions in total
- 3 multiple choice questions
- 15 requiring a narrative answer
### Different EPP policies across Region 5, CA, SOP

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

* SOP - City of Phoenix, AZ  * Other - Private Company
### Different EPP goals across Region 5 and Region 9 states

<table>
<thead>
<tr>
<th>EPP Goals</th>
<th>INTERVIEWEES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R5S-1</td>
</tr>
<tr>
<td>Lower environmental impacts through purchasing</td>
<td>Green</td>
</tr>
<tr>
<td>Encourage and sustain markets for products made from recycled materials</td>
<td>Blue</td>
</tr>
<tr>
<td>Encourage local or domestic production of goods and services</td>
<td>Beige</td>
</tr>
<tr>
<td>Reducing adverse impacts on health, social conditions and the environment</td>
<td>Beige</td>
</tr>
<tr>
<td>Support businesses owned by under-represented groups</td>
<td>Red</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Weightage of environmental performance in purchasing decisions</th>
<th>INTERVIEWEES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R5S-1</td>
</tr>
<tr>
<td>Equal to cost and function</td>
<td></td>
</tr>
<tr>
<td>Greater than cost and function</td>
<td></td>
</tr>
<tr>
<td>Less than cost and function</td>
<td></td>
</tr>
<tr>
<td>Other comments</td>
<td></td>
</tr>
</tbody>
</table>

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Major findings

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

<table>
<thead>
<tr>
<th>State</th>
<th>EPP Policies linked to</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>Legislation (AB262, SABRC) mandating GHG reductions and purchase of products with recycled content</td>
</tr>
<tr>
<td>MN</td>
<td>Executive Order</td>
</tr>
<tr>
<td>City of Phoenix</td>
<td>Voluntary</td>
</tr>
</tbody>
</table>

➢ 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.
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,
  - 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.

Thank You

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Why the world has a plastic waste problem, and how to fix it