Towards Zero Waste: A Study in Reducing Non-Hazardous Lab Waste

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Research Question: What Zero Waste design strategies will further reduce non-hazardous waste production at university labs?

Project Rationale and Background

- University of Calgary research labs produce high volumes of non-hazardous lab waste, including:
  - Unrecycled glass and plastic
  - Discarded lab equipment
  - Contaminated mixed recycling
- Estimated non-hazardous waste production: 20-25 tonnes

Blue Bucket Program

- Container for pointy end plastics and broken/unbroken glassware.
- Contents directed to city landfill
- Intended consequence – caretaker safety
- Unintended consequence – often confused with mixed recycling program.
- Pain points of Blue Bucket program highlights the importance of evaluating non-hazardous waste production at labs

Methodology

- Project Components and methodology
  - Literature review
  - Lab worker survey and analysis
  - Lab worker and expert interviews
  - Historical waste data analysis
  - Waste diversion GHG reduction calculations
  - Cost/effort matrix analysis

Project Design

- Recommendations based on 3 sections of Circular Economy ladder
  - Reimagine: Creating processes and procedures to minimize waste production
  - Repurpose: Maximize use and re-use of materials
  - Residuals: Maximize waste diversion

Results: Lab Worker Survey Summary

<table>
<thead>
<tr>
<th>Most Helpful Way to Improve Non-Hazardous Waste Protocols</th>
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</thead>
<tbody>
<tr>
<td>Video</td>
</tr>
<tr>
<td>Disposal training seminar</td>
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<tr>
<td>Reminder emails</td>
</tr>
<tr>
<td>Waste Audit</td>
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<tr>
<td>Poster</td>
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<tr>
<td>Reduction targets workshop</td>
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<tr>
<td>Dedicated staff member</td>
</tr>
</tbody>
</table>

Top three choices to improve Blue Bucket disposal guidelines

- Additional pictures: 69%
- Extra descriptions: 43%
- Fewer descriptions: 1%
- More instructions for preparation: 36%
- Fewer instructions for preparation: 1%
- Guidance on hazardous/non-hazardous items: 24%
- Other: 13%

Analysis: Cost & Effort Matrix

<table>
<thead>
<tr>
<th>Sustainable Lab Activity Cost and Effort Categorization</th>
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</thead>
<tbody>
<tr>
<td>Institution sustainability strategy driven</td>
</tr>
<tr>
<td>Lab-centric activities</td>
</tr>
<tr>
<td>Education oriented activities</td>
</tr>
</tbody>
</table>

Description: 23 sustainable lab activities ranked based on relative effort and relative cost and plotted on a matrix. Activities categorized into four types. Key recommendations highlighted (★ = Reimagine, ★★ = Repurpose, ★★★ = Residuals)

Recommendations: Reimagine (Designing Sustainable Systems)

- Attach infographic to all Blue Buckets
- Create and distribute videos demonstrating proper sorting of non-hazardous lab waste
- Facilities sends periodic reminder emails of waste sorting protocols

Recommendations: Repurpose (Maximize Use and Re-use)

- Implement specific waste stream for recycling lab glass and lab plastic. Promote amber glass sanitizing and reuse.
- Organize and implement lab equipment re-use and surplus sale program.
- Education campaign for green purchasing.

Recommendations: Residuals (Maximize Waste Diversion)

- Collect and distribute lab waste diversion statistics
- Lab waste diversion is tracked and distributed via online dashboard

Acknowledgements

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Video Showcase

Check out the 2 minute video summary

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