LIQUIGLIDE
QUANTIFYING ENVIRONMENTAL BENEFITS

I PROJECT OBJECTIVES
LiquiGlide has tasked our team with quantifying the sustainability benefits of their product. The LiquiGlide team believes their product could have major environmental payoffs, both by reducing waste and by decreasing friction in production and manufacturing processes, which could reduce greenhouse gas emissions and water and raw materials usage.

We have used a Life Cycle Analysis (LCA) to develop a framework around quantifying LiquiGlide’s sustainability benefits in a phase of the production process for a large commercial paint manufacturer.

II WHAT IS AN LCA?

<table>
<thead>
<tr>
<th>Goal Definition</th>
<th>Inventory Analysis</th>
<th>Impact Assessment</th>
<th>Interpretation</th>
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<tbody>
<tr>
<td>Describe the process and establish the context of the assessment and the boundaries of the analysis</td>
<td>Identify and quantify the key environmental resource and impact metrics chosen</td>
<td>Assess the human and ecological impacts of the resources and impacts identified in previous step</td>
<td>Evaluate the analysis and assessment while acknowledging uncertainty and assumptions</td>
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III BENEFIT BREAKDOWN

| RECYCLING | LiquiGlide’s facilitation of complete evacuation of consumer packaged goods encourages consumers to recycle packaging, and can prevent the pollution of paper products in single stream recycling communities. |
| PRODUCTION | LiquiGlide is applied throughout the production process of viscous products to create slippery surfaces that allow for more efficient pumping, increased energy and resource efficiency, and waste reduction |
| WASTE | LiquiGlide’s application to packaging allows for full evacuation of products and prevents waste. However, this waste reduction may be mitigated if consumers repurchase these products more frequently |

IV APPLICATION

LATEX PAINT PRODUCTION PROCESS

1. Pre-Dispersion
   Pigment is premixed with resin and one or more solvents and additives to form a paste
2. Dispersion
   Paste is exposed to high-speed agitation by a toothed blade blending pigment into solvent
3. Thinning
   Paint is transferred to large kettles to be thinned to produce the final product
4. Packaging
   The finished paint product is pumped into cans that are boxed and stacked
5. Cleaning
   Walls are cleaned by removing the paint so that a batch of a new paint can be produced
6. Waste Water Treatment
   Waste is treated on-site to the standards of the local wastewater treatment facility

V ILLUSTRATIVE CASE

Cleaning sub-process

<table>
<thead>
<tr>
<th>Assumptions</th>
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<tbody>
<tr>
<td>Facility Total</td>
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<tr>
<td>Energy use per year (kWh)</td>
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<tr>
<td>Energy cost per year</td>
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<td>Pounds of CO₂ per year</td>
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Assumed Savings with LiquiGlide’s Application

- Reduction in part wash water per cleaning: 90%
- Increase in no. of production runs per cleaning (multiplier): 2.0x
- Increase in no. of cleaning cycles before water change (multiplier): 10.0x

Total Reduction of Energy Use: -94.3%

VI NEXT STEPS

1. Refine model based on particular facility data and process
2. Extrapolate to estimate company-wide / national production
3. Expand analysis to include raw inputs production impact (e.g., pigments, additives, solvents, etc.)
4. Include full byproduct analysis to assess impact on VOC and other gases and downstream treatment of effluent and byproducts