Under pressure from the organization to look for Carbon Footprint (CF) reducing opportunities, various departments began looking for carbon saving projects. The Fabric Maintenance department at a large offshore operator contacted Sullexis, asking us to identify options for CF reduction with the paint used extensively in corrective & preventive maintenance.

What we found

• Container sizes varied from 1 quart to 55 gallon
• No standard measurement for Carbon Footprint
• Most of the supply chain outsourced
Here’s The Thing About Reducing Carbon Footprint

Factors outside operators sphere of influence
• Raw material acquisition
• Paint manufacturing practices
• Container manufacturing practices
• Shipping & transportation outsourced

Factors within operators sphere of influence
• Maintenance plans
  • Gallons of paint per shipment
  • Number of shipments per platform
• Paint container types
  • Plastic
  • Low carbon steel
  • Recirculated steel
Biting Off More Than You Can Chew

Upstream
- Raw Materials
- Manufacturing
  - Paint
  - Containers
- Transportation
  - Trucking
  - Shipping

Downstream
- Disposal & Recovery
A full Life Cycle Analysis (LCA) of the paint cans would involve:

- Shipping data
  - 3rd party
- Raw material usage: amounts mined per container, associated equipment
- Raw earth costs: Impact of mining
- Transportation: shipping from source to destination
  - multiple countries
  - multiple companies
- Disposal impact: solid waste, runoff

*Total Cost of LCA would be prohibitive for a single department.... Must Limit Scope!*
Estimating Carbon Footprint - A Bottom-Up Approach

Validate Against Known Actuals
- Validated with a 3rd party specializing in LCA studies

Investigate: What can we observe
1. Number of Containers
2. Weight of a single container
3. Container material types
4. Production Impact (KgCO2e/kg) of a single container

Expressing The Results
- Multiple iterations with client
- Used base “savings” to further estimate
  - Savings from recycled metal
  - Savings from stainless steel

Putting It Together
- Determined yearly impact of each container
- Compared to a projected impact of 55-gallon containers
- Quantified “savings”
- Quantified savings/dollar spent

Limit Scope - What do we know
- Client has no standard metric for C.F.
- LCA Study would be too expensive
- Client is only interested in what they can control
- Client only has shipping data
- Targeting 55 gallon drums (metal or plastic)
What the Client Gave Us

Client provided
• Container Shipping data from 2019
  • Count broken down by product and type
  • Sizes [1 gal, 5 qt, 55 gallon, 5 gallon...]
  • Type [plastic, metal]
  • All sourced from individual suppliers

<table>
<thead>
<tr>
<th>Product Purchased</th>
<th>container_type</th>
<th>Quantity</th>
<th>Product Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product 1</td>
<td>Plastic Sulzer Cartridge</td>
<td>75</td>
<td>Cat A</td>
</tr>
<tr>
<td>Product 2</td>
<td>Plastic Sulzer Cartridge</td>
<td>19</td>
<td>Cat B</td>
</tr>
<tr>
<td>Product 3</td>
<td>1 Quart Metal Paint Can</td>
<td>264</td>
<td>Cat C</td>
</tr>
</tbody>
</table>

Google provided
• Standard metrics to measure Carbon Footprint
• Average weights of materials

<table>
<thead>
<tr>
<th>Container Name</th>
<th>KgCO2e/lb</th>
<th>Material Type</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gallon Metal Can</td>
<td>0.743892371</td>
<td>Metal</td>
<td>0.89</td>
</tr>
<tr>
<td>1 Gallon Plastic Jug</td>
<td>1.206557139</td>
<td>Plastic (HDPE)</td>
<td>0.31</td>
</tr>
<tr>
<td>55 Gallon Metal Drum</td>
<td>0.743892371</td>
<td>Metal</td>
<td>48</td>
</tr>
<tr>
<td>55 Gallon Plastic Drum</td>
<td>1.206557139</td>
<td>Plastic (HDPE)</td>
<td>22</td>
</tr>
</tbody>
</table>
**Analysis Summary**

- Over the next 5 years, assuming the same volume of paint used, the following amounts of CO2e would be produced by the paint containers:
  - 1-gallon can = 14,000 Kg
  - 55-gallon single use recycled steel drum = 5,000 Kg
  - 55-gallon stainless steel recyclable = 4,000 Kg

- Using recycled steel drums significantly reduces CO2e for the first 5 years at a lower price point than stainless steel:
  - 55-gallon single use recycled steel drum = $0.03/KgCO2
  - 55-gallon stainless steel recyclable = $0.30/KgCO2
The Challenges – Scaling

- Before we can save, we must learn how to scale

- Tons saved from 1 process improvement in a sub-section of 1 department:
  - 10 metric tons CO2e

- Possible Savings:
  - 10 metric tons * 3 * potential # of improvements * # of operators
The Challenges - The Problem of Standardization

- Reusable pieces
  - Estimation methodology... Might not hold up under scrutiny
- We need standards
  - Carbon reporting
  - Carbon Capturing/Calculation
  - Carbon Constants (.74 KgCO2e/lb)
- Possible solutions
  - Supply Chain & Order Domains
    - BOM’s could be modified to provide more operating details for carbon-emitting parts
    - Emissions could be packaged by process, instead of by part for reduced complexity and greater scale
Thank you!