We Make Information Useful.

Carbon Emissions Captured on the Frontlines: *A Use Case for Standardizing Carbon Emissions Data*

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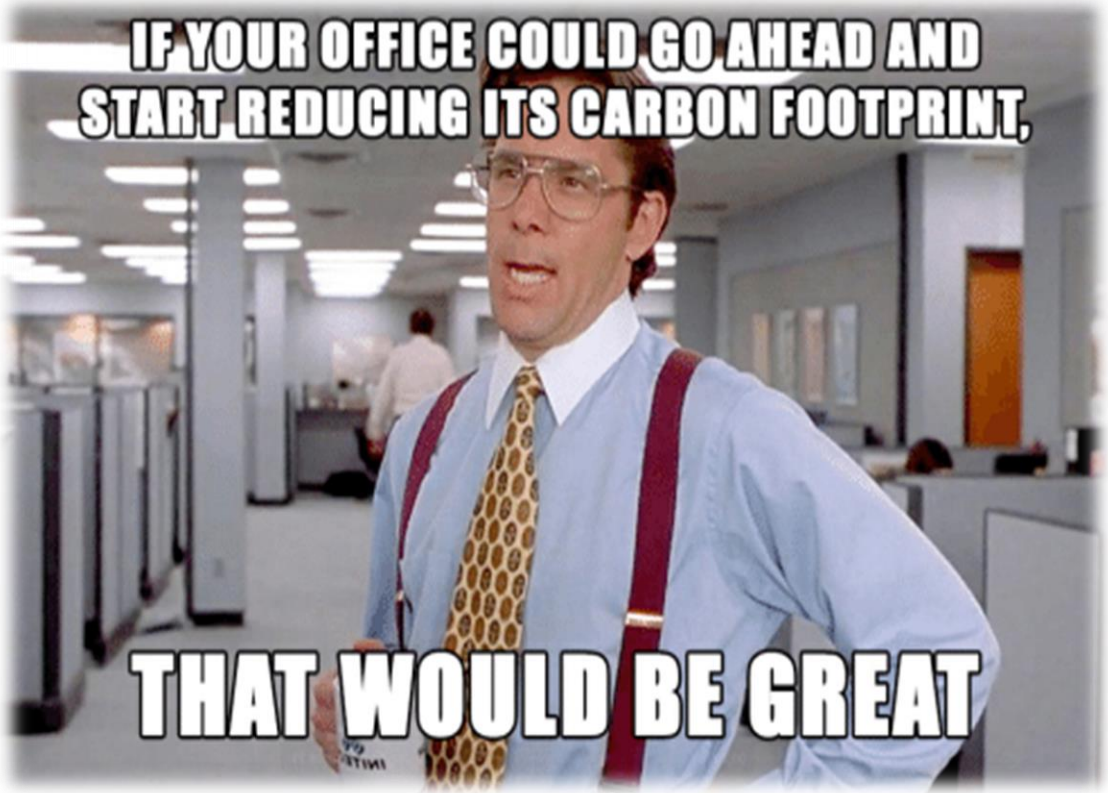
SULLEXIS

Integrity Management: A New Hope

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

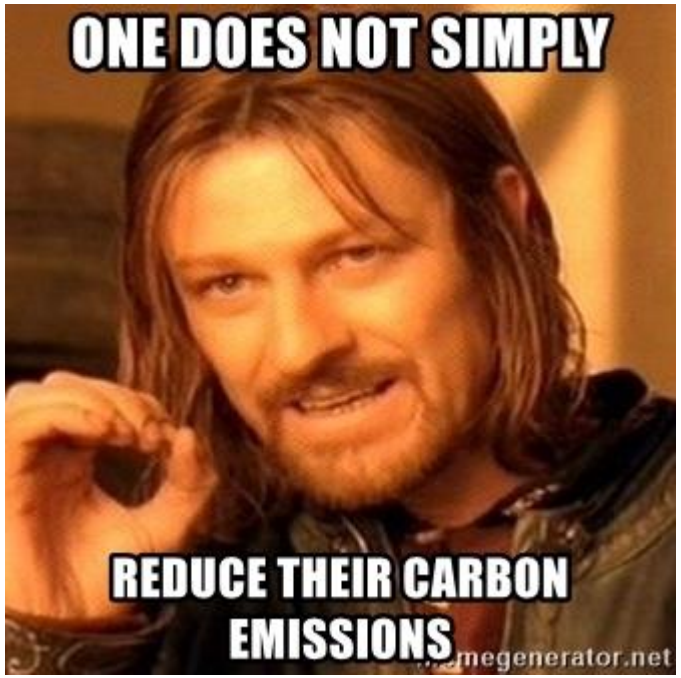
Here's The Thing About Reducing Carbon Footprint

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



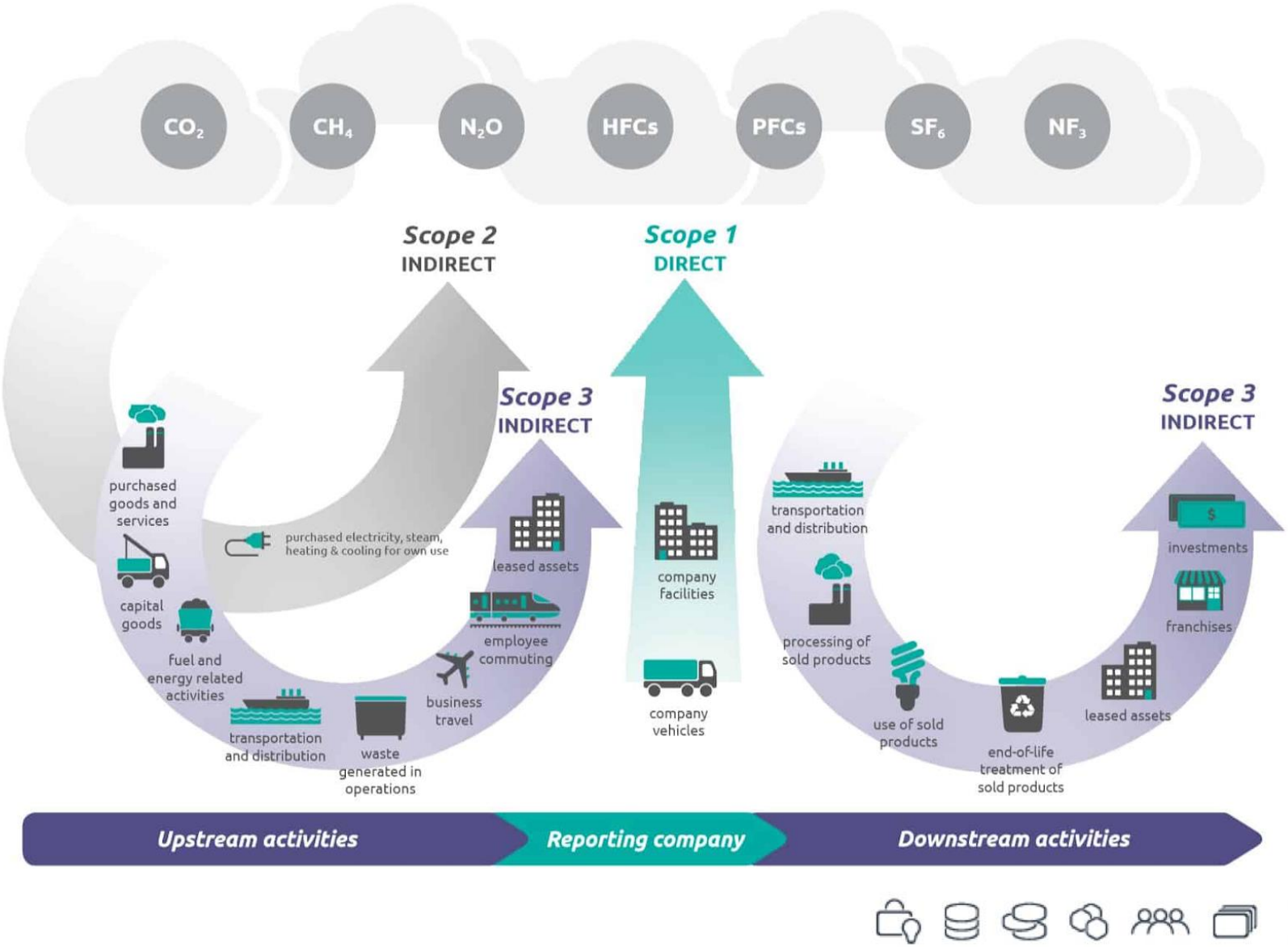
Biting Off More Than You Can Chew

Upstream

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

Downstream

- Disposal & Recovery



The Problem: Getting Too Deep in the Weeds

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!

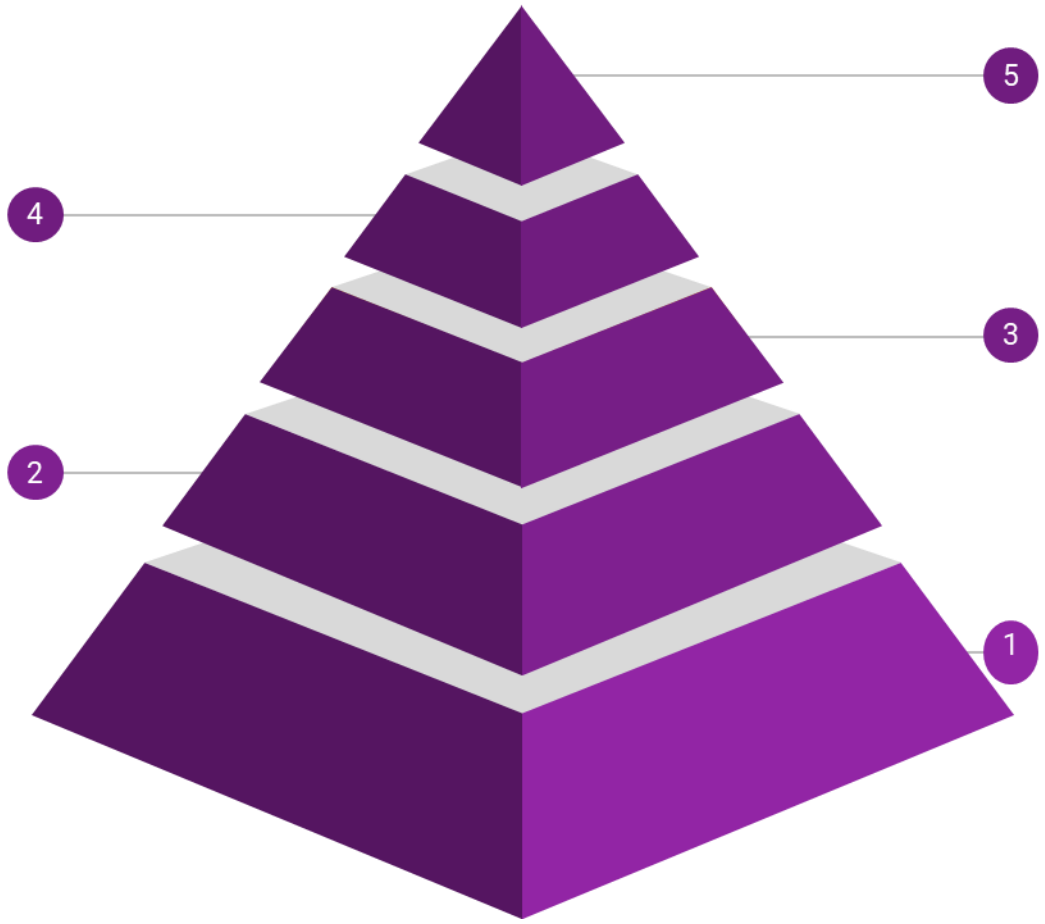
Estimating Carbon Footprint - A Bottom-Up Approach

Validate Against Known Actuals

- Validated with a 3rd party specializing in LCA studies

Investigate: What can we observe

- ➔ Number of Containers
- ➔ Weight of a single container
- ➔ Container material types
- ➔ Production Impact ($KgCO_2e/kg$) 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

Product Purchased	container_type	Quantity	Product Category
Product 1	Plastic Sulzer Cartridge	75	Cat A
Product 2	Plastic Sulzer Cartridge	19	Cat B
Product 3	1 Quart Metal Paint Can	264	Cat C

Google provided

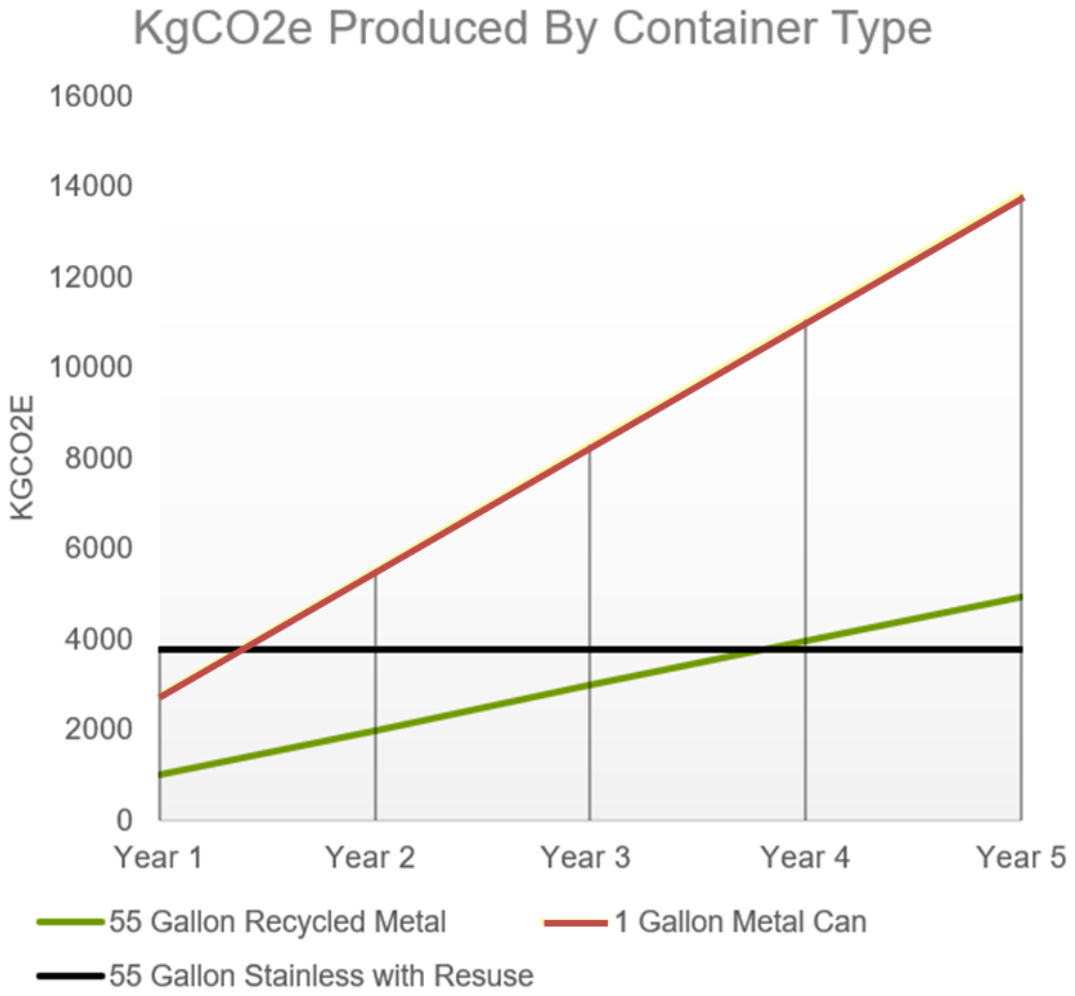
- Standard metrics to measure Carbon Footprint
- Average weights of materials

Container Name	KgCO2e/lb	Material Type	Weight (lbs)
1 Gallon Metal Can	0.743892371	Metal	0.89
1 Gallon Plastic Jug	1.206557139	Plastic (HDPE)	0.31
55 Gallon Metal Drum:	0.743892371	Metal	48
55 Gallon Plasitic Drum	1.206557139	Plastic (HDPE)	22

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

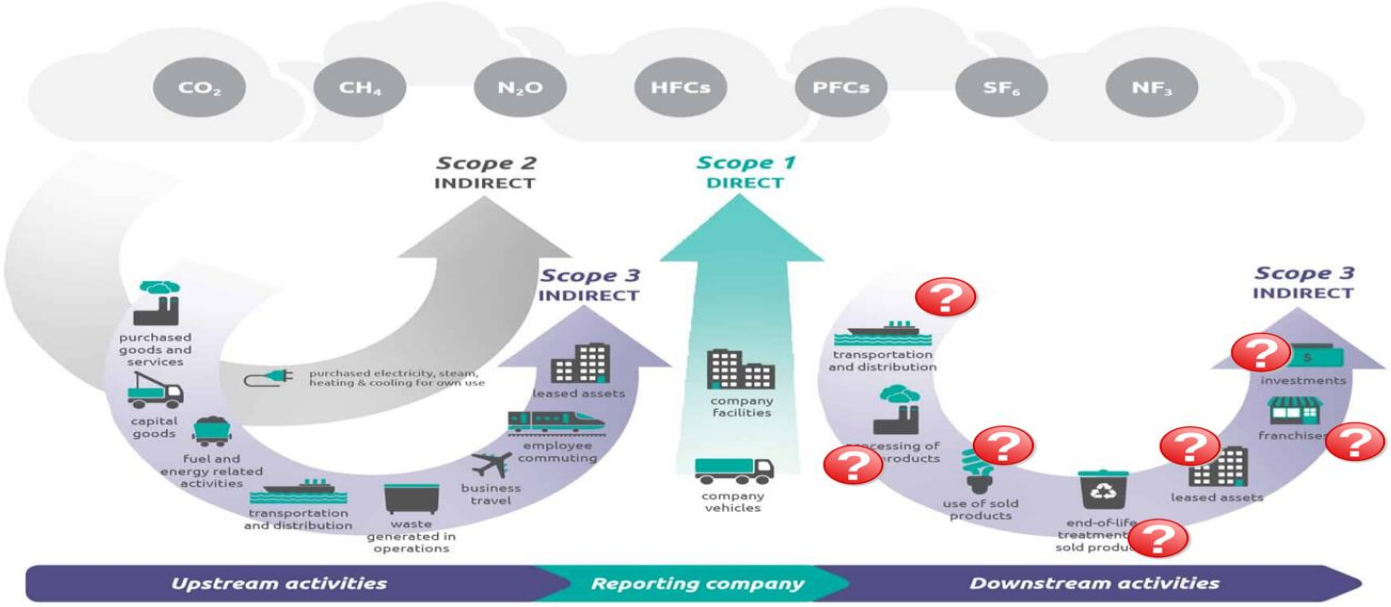
- Using recycled steel drums significantly reduces CO2e for the first 5 years at a lower price point than stainless steel:
  - 55-gallon single use recycled steel drum = $0.03/KgCO2
  - 55-gallon stainless steel recyclable = $0.30/KgCO2



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

EPA United States Environmental Protection Agency

Standards
- Units
- Minimum reporting requirements

Q&A

Thank you!