Unit 4: Life Cycle Assessment

Session 2:
An Overview of Life Cycle Assessment

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How would you make an engineering decision based on indirect costs?
Example:

Comparing Grocery Sacks

Comparing Paper and Plastic:
Comparing Unit Production Energy

Comparing 1 p assembly 'Eco Paper Bags 1 kg' with 1 p assembly 'Eco Plastic Bags 1 kg'; Method: Cum
What about product design?

Comparing Paper and Plastic:
Production Energy of a Single Bag
What happens to the bag after production?

Comparing Paper and Plastic:
Comparing Unit Production Energy with Recovery
Materials Substitution: 
Making Better Materials Choices

Which Material would you Choose?

<table>
<thead>
<tr>
<th>Material A</th>
<th>Material B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2 2 kg/kg</td>
<td>CO2 11 kg/kg</td>
</tr>
<tr>
<td>SO2 0.008</td>
<td>SO2 0.4</td>
</tr>
<tr>
<td>NOx 0.007</td>
<td>NOx 0.3</td>
</tr>
</tbody>
</table>

Why does B advertise itself as Environmental?

Emissions from Production

kg Released per kg Produced

Why does B advertise itself as Environmental?
What is Life-cycle Assessment?

• SETAC Definition:
  “The life cycle assessment is an objective process to evaluate the environmental burdens associated with a product, process, or activity by identifying and quantifying energy and materials usage and environmental releases, to assess the impact of those... and to evaluate and implement opportunities to effect environmental improvements...”

LCA: Methodology

• Goal & Scope Definition
  - What is the unit of analysis?
  - What materials, processes, or products are to be considered?

• Inventory Analysis
  - Identify & quantify
    - Energy inflows
    - Material inflows
    - Releases

• Impact Analysis
  - Relating inventory to impact on world