Life Cycle Analysis

Quantifying Cotton’s Footprint
Overview

- What is “LCA” and “LCI”
- Overview of the current effort to develop a robust LCI for cotton
- Example results from Levi’s LCA for 501 Jeans
- Pat O’Leary to provide details on the agricultural data collection.
“Life Cycle” Perspective on Cotton

- Cotton Production
- Fabric
- Consumer Use
- Finish/Cut/Sew
- End of Life
ISO 14044 – LCA Process

- Goal and Scope Definition of the Project
- Life Cycle Inventory Development
  - Data collection
  - Literature review
- Impact Assessment
- Interpretation
- Critical Review
Vision 21 LCI

- Collaborative effort:
  - Cotton Foundation
  - Cotton Incorporated
  - Cotton Council International
  - PE Americas
  - Carbon Trust

- **Goal**: Compile a robust and comprehensive life cycle inventory for cotton.
Why does it matter?

Energy Required to Produce a Finished Fabric
MJ per kg of cotton

- Winchester - 3:1 Power
- Australia T-Shirt
- Australia Woven
- Levi - 501 Jeans*
- 1995 Lit-knit shirt*
- EcoInvent

- Textile*
- Dye/Finish
- Fabric
- Yarn
- Fiber
Working with Design for Environment

Basic approach – Way of thinking

- **LCA design**

- **designer know-how**
  - design parameter
  - different alternatives, material choice, utilization and EoL

- **information from other tools & DBs**
  - e.g. CAD, regulations, recycling

- **Internal correlation of data to the specific design**

- **decision support for new design**

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**GaBi 4 software system** ➔ **process analysis, system modeling** ➔ **GaBi 4 database**

**LCE Tool**

**DfE Tool**

**background DB**
Vision 21 Data Collection Overview

- Agricultural Production by region
  - China
  - India
  - US

- Textile Production (knit and woven)
  - China
  - India
  - Turkey
  - Latin America
Cotton Incorporated's Lifestyle Monitor™ Survey: How Consumers **WASH** Apparel & Home Textile Products

<table>
<thead>
<tr>
<th>Item</th>
<th>Wash in Washer with Warm Water</th>
<th>Wash in Washer with Cold Water</th>
<th>Wash in Washer with Hot Water</th>
<th>Usually Dry Clean</th>
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</thead>
<tbody>
<tr>
<td><strong>Pajamas</strong></td>
<td>47%</td>
<td>44%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>A pair of denim jeans</strong></td>
<td>60%</td>
<td>34%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Dress</strong></td>
<td>53%</td>
<td>26%</td>
<td>19%</td>
<td>1%</td>
</tr>
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</table>
Levi’s® LCA Study

- See:
  - Or Google “Levi’s LCA jeans”

- Study based on:
  - Levi’s® 501® Jean; 0193 Finish; Medium Stone Wash
  - 2006 Production year
  - Cotton – West Texas; MS; Brazil -> Fabric (Mexico) -> cut & sew (Dominican Republic) -> US Consumer -> Landfill [Habitat house in New Orleans]
Levi’s® 501® Jeans – Energy Use

For the studied Levi’s® 501® jeans (cradle to grave), the energy-use impact was highest at the consumer-use phase (58%).

Total = 400 MJ = 111 kWh = 379,127 BTU = 2.7 gal diesel

⇒ Powering a computer for 70 days (8-hr per day)