Greening the Industrial Laundry Sector:  
Life Cycle Assessment of Polyester/Cotton Shirts  
Group Project Proposal  
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STATEMENT
Life Cycle Assessments (“LCAs”) are powerful tools that promote sustainable consumption and production patterns. The United Nations Environment Programme and the Society of Environmental Toxicology and Chemistry launched the Life Cycle Initiative in 2002 as an international partnership to put life cycle thinking into practice. Through this, governments were recognizing that LCAs are the instrument for creating a life cycle economy. Businesses are using LCAs as important tools for enhancing operations and profitability and reducing waste.

Mission Linen Supply (MLS), an industrial laundry and linen supply company headquartered in Santa Barbara, has over 200,000 poly/cotton rental shirts in service throughout the Western US. This short-sleeve button down shirt – part of the standard uniform for many service employees – is comprised of 65% polyester and 35% cotton, a ratio designed to maximize the benefits of the two threads used in its fabrication. Companies rent these garments to ensure consistency in employee appearance; the linen supply company is then responsible for laundering, upkeep, and disposal. As industrial laundry facilities are subject to increased regulations, waste products generated during the use and cleaning process are captured and managed more effectively as compared to home or on-premise (at the site of business) laundries.

For the scope of this group project, MLS proposes a life cycle assessment (LCA) of the poly/cotton rental shirt. All aspects of the shirt’s life cycle will be assessed, from choice of materials, production processes and transportation to end-of-life (EoL) uses for shirts retired from service, which currently wait in a warehouse for anticipated re-uses. The National Risk Management Research Laboratory of the Environmental Protection Agency maintains extensive online resources for Life Cycle Assessments, which will guide the parameters of this project. In keeping with its ongoing sustainability efforts, MLS desires to eventually extend LCAs to its entire rental portfolio of garment and linen types.

OBJECTIVES
In this project, the group will design, implement, and assess a LCA for the 65%/35% polyester/cotton shirt. The group will:

- Assess the environmental and financial costs associated with creating the fabric for the shirt;
- Evaluate end-of-life options for the reuse and/or disposal options of the garments;
- Recommend operational changes that emphasize a ‘cradle-to-cradle’ rather than a ‘cradle-to-grave’ approach;
- Perform a cost benefit analysis on proposed solutions;
- Evaluate the profitability of marketing efforts that highlight reductions in environmental impact, identified through the LCA;
- Create a metric that can be used to assess the environmental impacts of other items in the Mission Linen Supply rental portfolio, including sheets, tablecloths, and napkins.
SIGNIFICANCE

Information sharing from the LCA results of this project offers the potential for wide ripples throughout the textile sector. Consider the following apparel industry cases:

- “The average American throws away about 68 pounds of clothing and textiles per year, and while a few communities have textile recycling programs, about 85% of this waste goes to landfills today, where it occupies about 4% of landfill space.”

- “For every 150 virgin polyester jackets that we replaced with post consumer recycled (PCR) polyester, we saved 42 gallons of oil and prevented a half-ton of toxic air emissions.”

- “Cotton items are commonly washed at 70 °C whereas synthetics are washed at 40 °C...by substituting ‘synthetic’ fibers for ‘cotton; there is considerable potential to reduce impact associated with consumer care.”

More immediately, it is envisioned that the results of the project will serve as the basis for future guidelines and policies by the Textile Rental Services Association (TRSA), of which MLS is a member. TRSA has begun to examine, improve, and market the sustainability efforts of the industrial laundry sector, especially as federal, state, and local governments enact stricter legislation on resource consumption and waste generation. MLS will engage with TRSA to share the results of the LCA in an effort to initiate and lead industry-wide improvements.

Additionally, MLS is tracking the greenhouse gas emissions of its operations. Currently, the company is focusing on cataloging and reducing Scope 1 and Scope 2 emissions; the goal is to expand these measures to Scope 3 emissions. The LCA will provide the framework for assessing and tracking this inventory.

BACKGROUND INFORMATION

Mission Linen Supply, headquartered in Santa Barbara with 50 locations throughout the Western US, is a privately-owned industrial laundry and linen supply company. Founded in 1930, MLS provides service to over 30,000 customers in five western states.

As part of its overall mission, MLS has continually identified areas in its operational processes to be improved. Water recapture, boiler stack economizers, heat exchangers, and other measures have all decreased MLS’s waste stream and energy usage. MLS is committed to continuing to reduce its environmental impacts at all levels of operations and throughout its supply chain. It also aims to be the industry leader in developing guidelines and policies for the industrial laundry sector.

Uniform rentals comprise a $4.7 billion industry in the United States and make up just one component of MLS’s business. Considering the breadth of comparable services (hospitals, hotels, restaurants, etc), the results of this project have great potential for expanded application.

MLS recently partnered with the University of California system (UC) to be the sole purveyor of uniform rental for all UC campuses and properties. The contract requires MLS to adhere to the UC’s Policy on Sustainable Practices while becoming a Corporate Sustainability leader within the industrial laundry sector, stating “for products and services that do not currently offer environmentally preferable alternatives, the University will work with its existing and potential suppliers to develop options.” In addition to improving MLS’s operation, the group project will serve the UC system’s mission of improving sustainable practices, and could help guide other education systems who seek to reduce their environmental impacts.

STAKEHOLDERS

- The University of California
- Textile Rental Services Association
- Garment Industries
- Life Cycle Assessment Analysts
- United Nations Environment Programme
- The Society for Environmental Toxicology and Chemistry
APPROACH AND AVAILABLE DATA

Data Available:
- Mission Linen Supply facilities data: water, utilities, chemical use, transportation
- GaBi4 (Bren)
- Vendors: Manufacture of fabrics, garment production, transport to vendor

Examples & previous projects:
- Deckers® Green ToeTM line for Simple Shoes®: The Development of a Standard Tool to Predict the Environmental Impact of Footwear
- Patagonia® – Water Footprint: Tracking the Impact of Patagonia Clothing and Apparel on Resources
- Southern California Edison® – Synergistic Energy and Water Conservation Strategies: the LCA of overhead versus underground power distribution in Southern California

The proposed shirt LCA, in its overall framework, has noted similarities to the Deckers and Patagonia LCA projects in regards to product manufacturing, yet furthers the evaluated life cycle by incorporating assessment of resource consumption throughout the shirt’s use.

DELIVERABLES

A final report and presentation will:
- Catalog and quantify resource requirements for the shirt’s various stages (material acquisition, use and cleaning, disposal, etc.);
- Summarize end-of-life options for the poly/cotton shirts to reduce disposal and increase reuse;
- Provide recommendations for changes within MLS’s own operational system;
- Evaluate the cost-benefit of recommended changes; and
- Establish sustainability guidelines and benchmarks to be used internally by MLS in a review of its other products and externally by other companies in the industrial laundry sector.

CLIENT DETAIL

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CLIENT COMMITMENT

Evaluating all aspects of the supply chain in regards to the 65%/35% poly/cotton shirt is an important component of MLS’s overall Sustainability Strategy and to the advancement of better environmental practices in the textile and apparel industries. MLS hopes to evaluate and quantify the processes at the farms and factories where the fabric materials are created and continue this evaluation through the end-of-life analysis of the garments. MLS is dedicated to making this garment part of a ‘cradle-to-cradle’, rather than ‘cradle-to-grave’, process. The company will work closely with the group; individuals from Management, Procurement, Sales, Marketing, Engineering, and Information Technology have been involved in the development of this proposal and will work actively with the group throughout the project.

FINANCIAL NEED AND SUPPORT

MLS and its staff will provide the necessary financial, operational, and administrative support needed for the group to perform their work. Reasonable expenses, including reimbursement for travel to/from MLS facilities, will be paid by the company. If further financial resources are required to support the project, MLS is open to exploring and evaluating these needs.
**INTERNSHIP OPPORTUNITIES**
There exists the possibility of a summer internship for 1 person. The internship would address many aspects of textile business including management, operations, and procurement. Travel to various plants in California and the southwestern United States may be necessary.

**REFERENCES**

1. *Why Take a Life Cycle Approach*