New York State Pollution Prevention Institute

Measuring Sustainability with Life-Cycle Assessment (LCA)

October 16, 2019

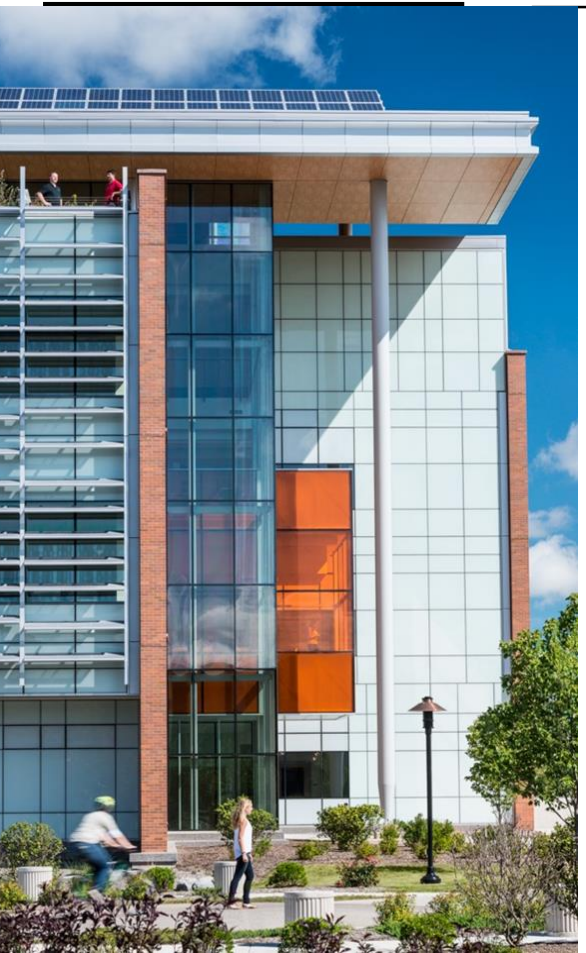
Kate Winnebeck, LCACP

Senior Project Manager

585-475-5390

kate.winnebeck@rit.edu

- Leads NYSP2I's LCA program
- Life cycle assessment certified professional (LCACP) for 8+ years
- Performs ISO compliant LCAs and peer reviews



NYS Pollution Prevention Institute

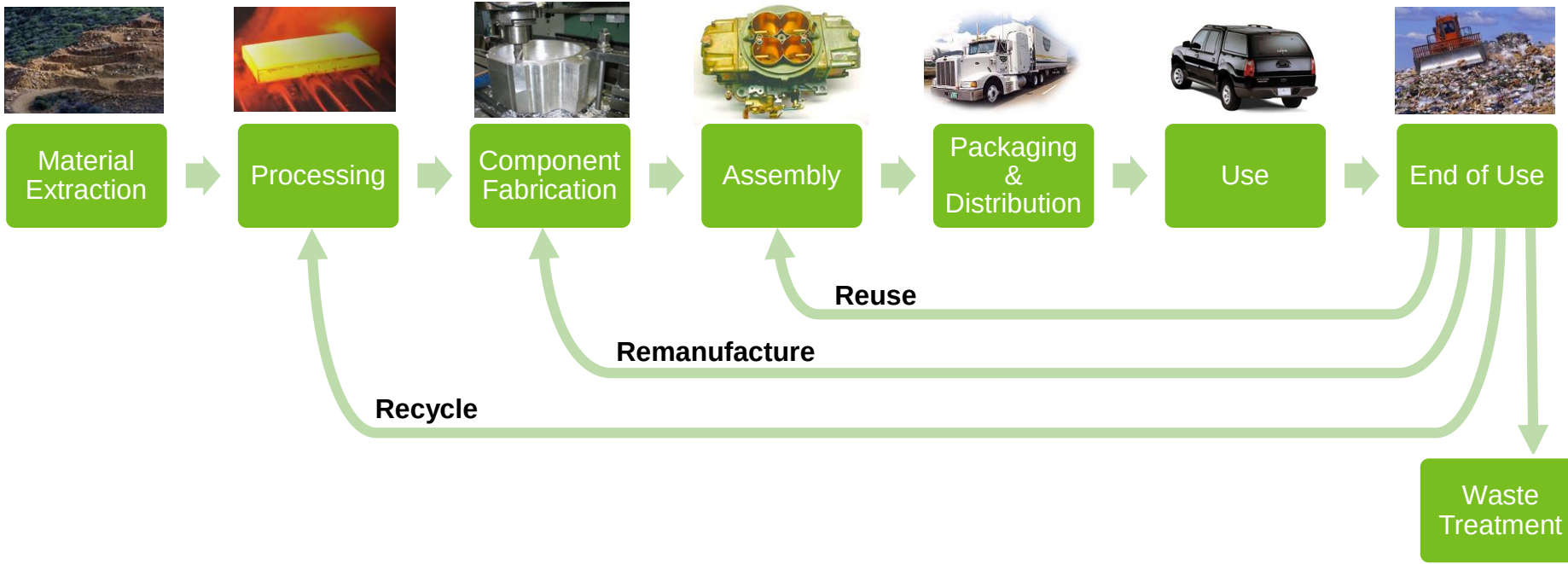
- HQ at RIT.
- Established in 2008.
- $3.9M in annual NYS funding administered through the NYS Department of Environmental Conservation.
- Focus areas include:
  - Sustainable-Manufacturing Assessments
  - Supply-Chain Sustainability
  - Technology Commercialization
  - Food-Waste Diversion
  - Outreach and Education
  - Research and Development
  - Emerging Contaminants

Outline

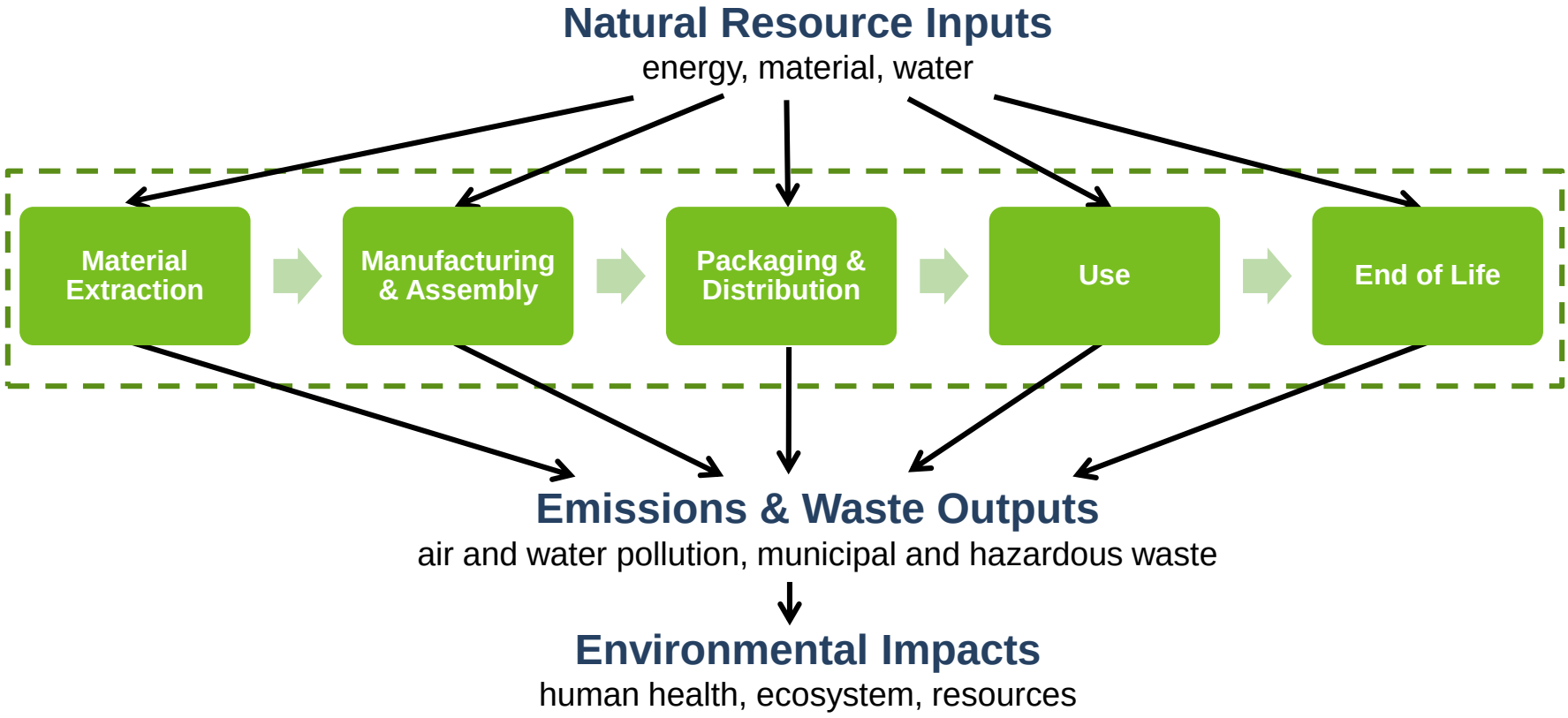
- What is Life-Cycle Assessment (LCA)?
- Using LCA to meet sustainability goals
- How to get started

Life Cycle Assessment (LCA)

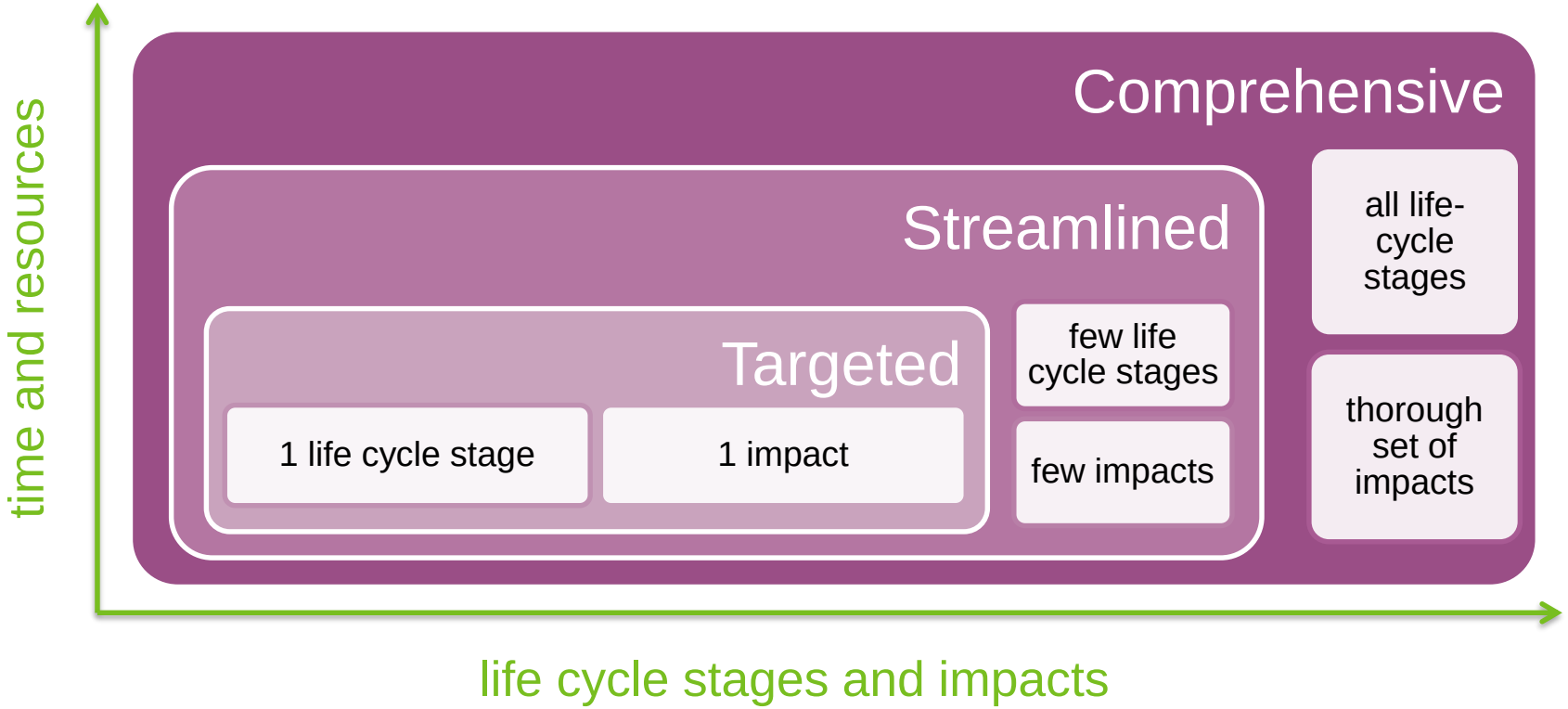
LCA is a technique used to quantify the environmental impact
of a product or process from raw material acquisition through to end-of-life disposition.



Life Cycle Assessment (LCA)



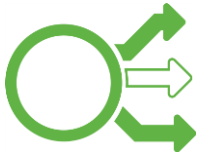
Types of LCA


time and resources
Comprehensive
Streamlined
Targeted
1 life cycle stage
1 impact
few life cycle stages
few impacts
all life-cycle stages
thorough set of impacts
life cycle stages and impacts

Benefits of LCA

Green-Product Marketing

Environmental Footprints



Decision-Making Guidance

Hot-Spot Analysis

Meeting Customer Demands

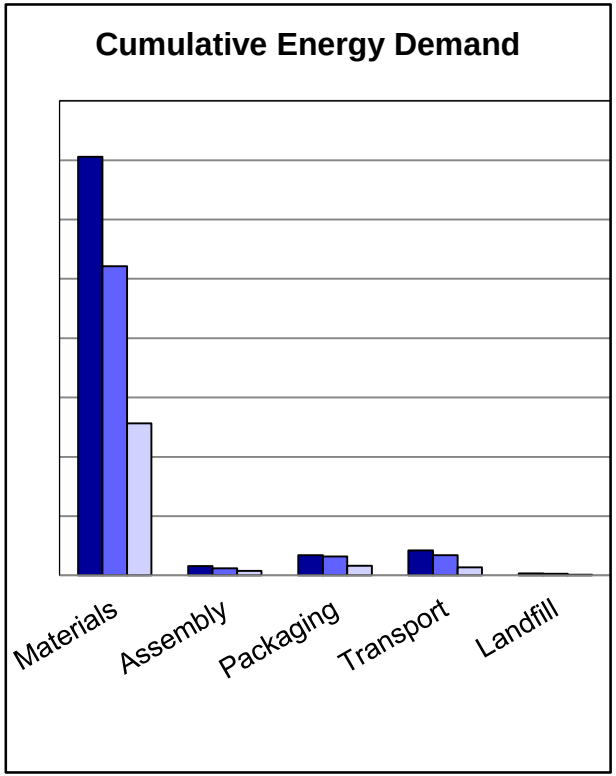
Third-Party Validation

LCA Case Studies

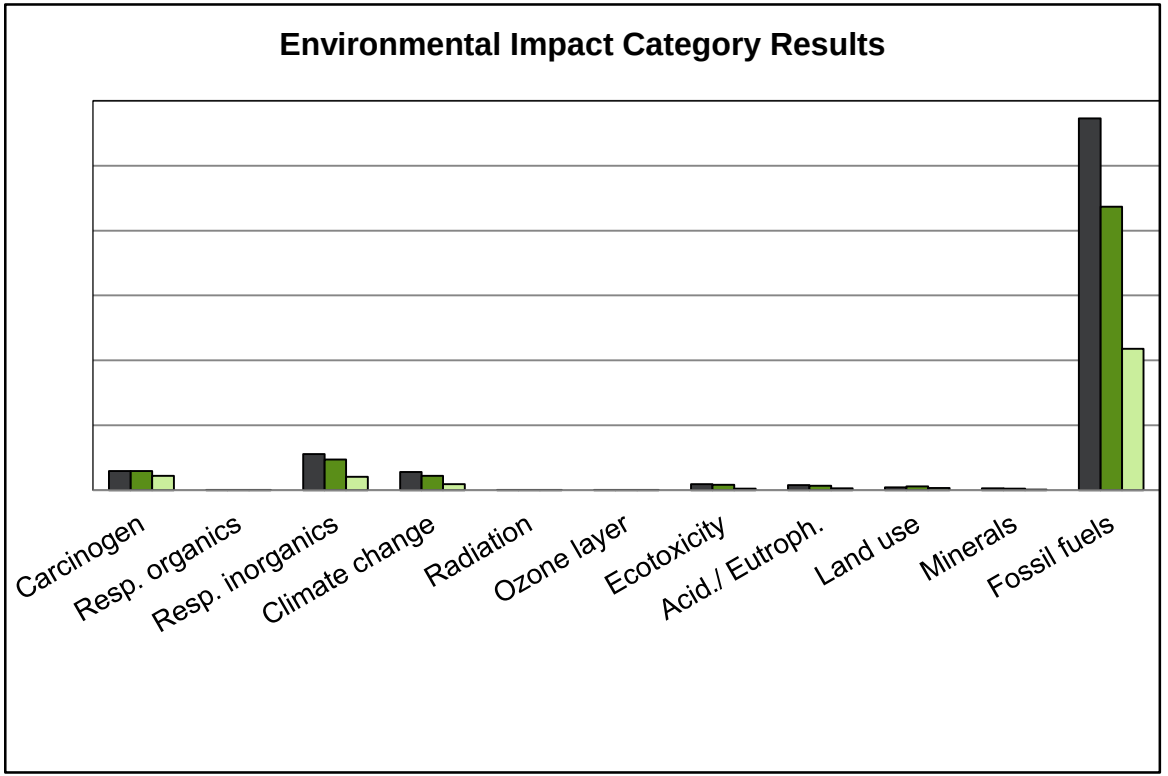
Support Product Design & Marketing

- **Challenge**: Quantify the environmental benefits of a redesigned blood-pressure cuff
- **Solution**: comprehensive, comparative-assertion LCA

Understand process contribution to impact

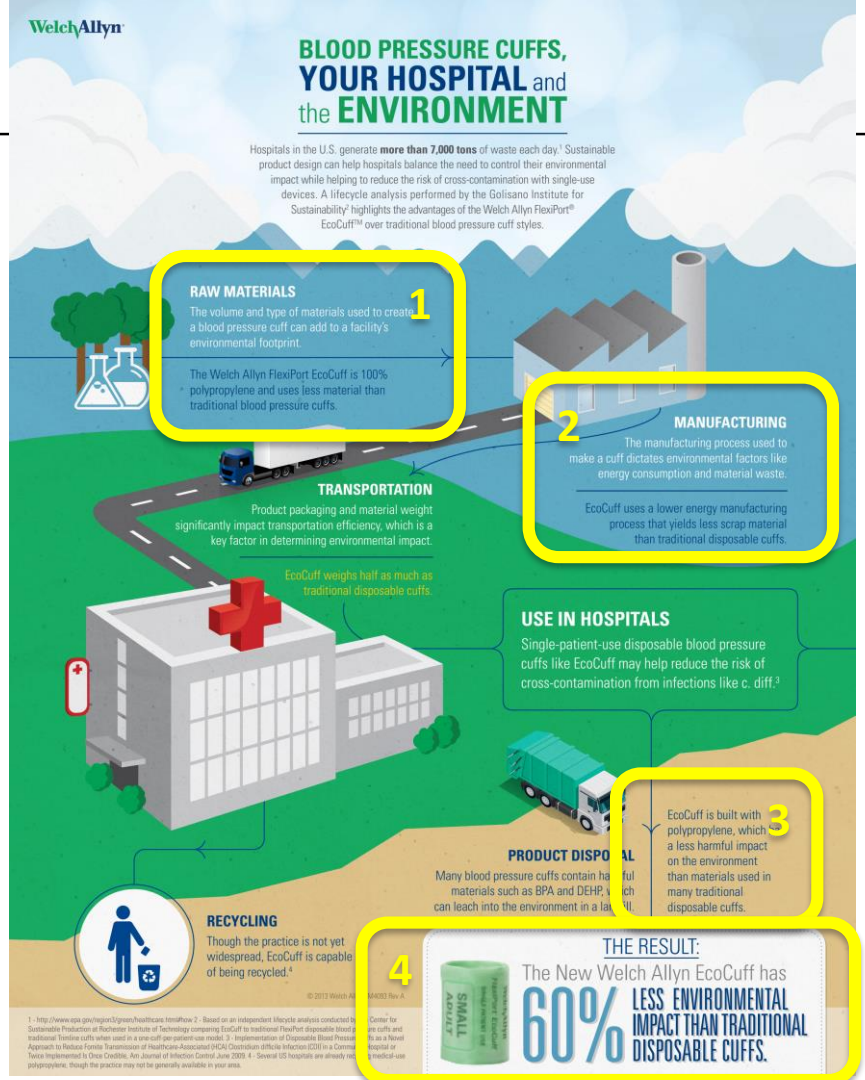


Understand specific environmental impacts



Impact of results

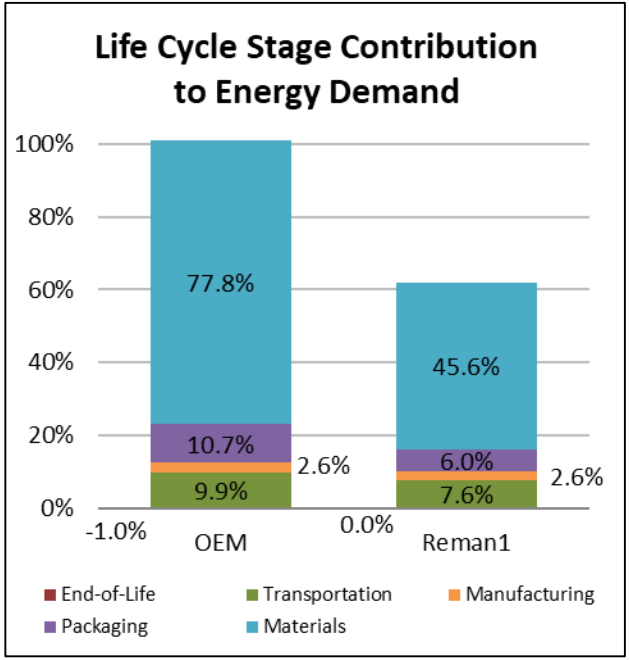
1. Credible marketing claims led to increased customers and sales
2. Put focus on manufacturing and supply-chain of highest impact parts and processes
3. Design team better understood the impact of their decisions
4. Instilled life-cycle thinking



Validate Remanufacturing

Staples

- **Challenge**: Compare the impact of a new and remanufactured toner cartridge
- **Solution**: comprehensive, comparative-assertion LCA
- **Impact of results:**
  1. Remanufacturing was shown to provide significant life-cycle environmental benefits when compared to new manufacture
  2. Major benefit realized through part-material and process recovery
  3. Highlighted the importance of “functional equivalence”



Make a difference.

Staples recycles your ink and toner cartridges.

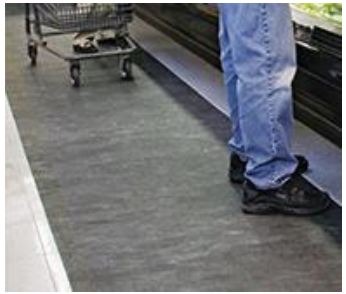
Staples is committed to recycling or reusing 100% of a cartridge's components, ultimately limiting the number of cartridges sent to landfills. The remanufactured toner process emits 60% fewer carbon equivalents than manufacturing a new cartridge. And each remanufactured toner helps save 2 quarts of oil.[1]

Cartridges that cannot be reused are recycled to create new products. The process is as follows:

Comparing Disposable and Durable Floor Mats

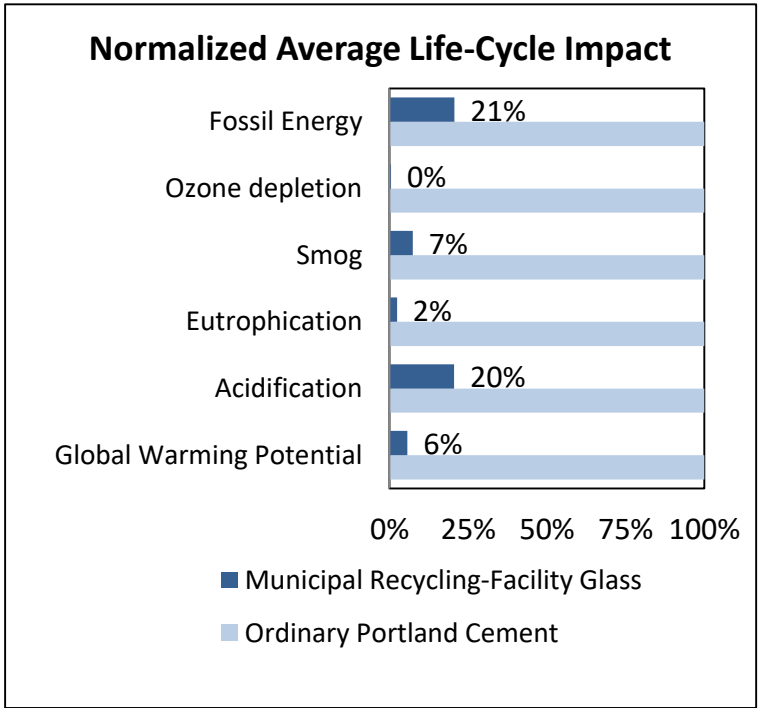
New Pig

- **Challenge**: Understand the environmental impact of a disposable floor mat to that of a reusable mat
- **Solution**: comprehensive, comparative-assertion LCA
- **Impact of results**:
  1. Expanded client's customer base and market share by validating and supporting environmental claims
  2. Educates and assists customers in making more informed purchasing decisions



Using Waste Glass to Offset Cement in Concrete

- **Challenge**: Quantify and qualify the environmental impact of replacing cement with post-consumer glass
- **Solution**: comprehensive LCA
- **Impact of results**:
  1. Potential expanded customer base
  2. Informs state and national glass recycling policies
  3. Reduced landfill volume
  4. More efficient building materials



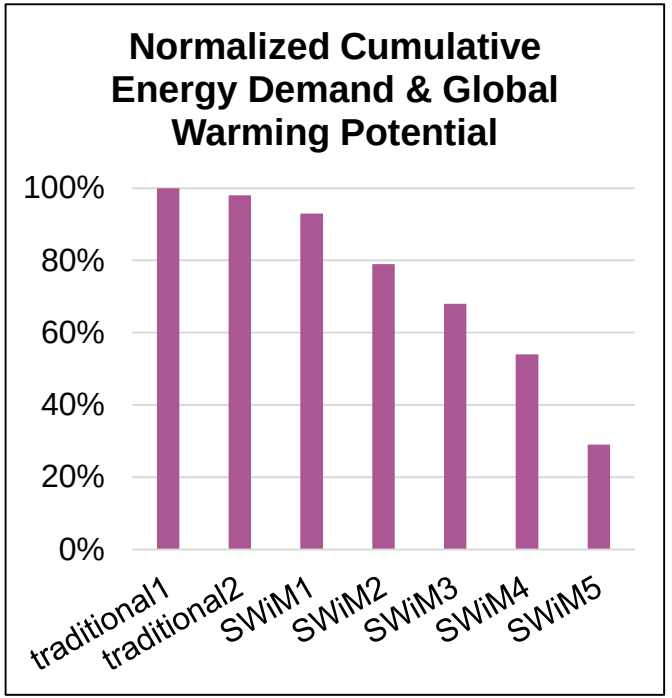
Validating a Product Designed to Increase Energy Efficiency

- **Challenge**: Quantify the impact of an air-conditioning-coil coating designed to increase energy efficiency
- **Solution**:
  1. sustainable materials assessment of the coating
  2. streamlined LCAs of an absorption chiller and electricity for 20 years of operation
  3. development of a life-cycle energy-use and cost tool to model effects over time
- **Impact of results**:
  1. Improved data collection methods
  2. Tool can be used to focus research and development efforts

Cost and Environmental Impact of Alternative Process

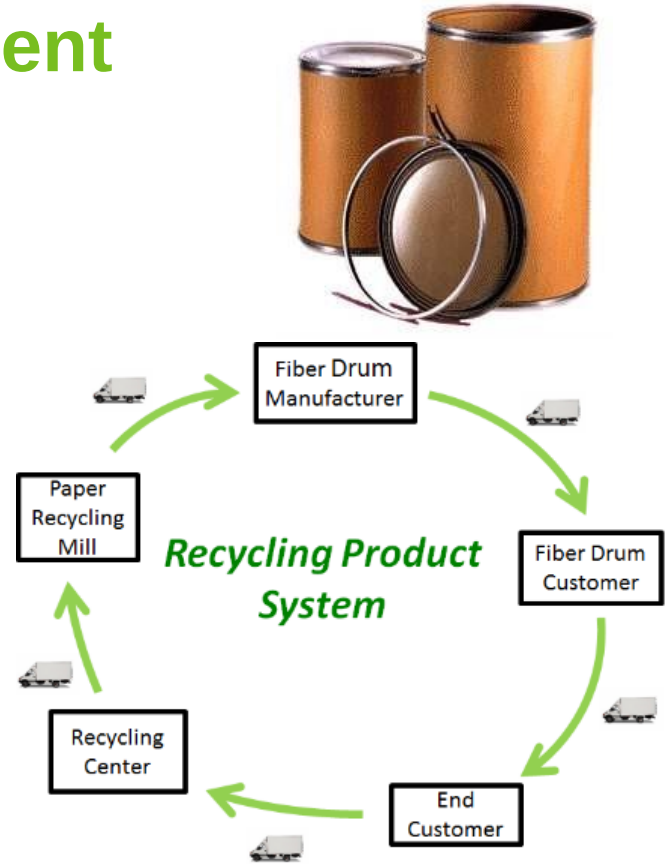
WIT Advisers
empowering sustainability
Sustainable Solutions for Landscape and Winter Management

- **Challenge:** Quantify cost and environmental impact of a snow- and ice-management removal process at 7 Syracuse-area grocers
- **Solution**: streamlined LCA, focused on mass of salt and global-warming potential
- **Impact of results**:
  1. Increased client base
  2. Focused company's data collection
  3. Hot spot analysis identified opportunities and tightened up process



Optimizing End-of-Life Management

- **Challenge**: Quantify environmental and economic life-cycle impact of distribution and material-reclamation scenarios for a fibre drum
- **Solution**: targeted LCA with scenario analysis (e.g., landfill, reuse, recycled into drums, and recycled externally)
- **Impact of results**:
  1. Supported internal decision making
  2. Hot spot analysis helped company to focus on high-impact areas



How to Get Gtarted

NYSP2I Can Help You

- Focus the goal and scope of an LCA.
- Design a study that meets your needs.
- Support product development, manufacturing, and supply chain by identifying areas for environmental improvement.
- Identify opportunities for LCA results to help increase market share and meet customer demands.

Thank you

Kate Winnebeck, LCACP
585-475-5390
kate.winnebeck@rit.edu

Rochester Institute of Technology
111 Lomb Memorial Drive, Bldg. 78-2000
Rochester, NY 14623

Phone: (585) 475-2512
Email: nysp2i@rit.edu
Web: www.rit.edu/affiliate/nysp2i

Funding provided by the State of New York.