



Life Cycle Environmental Assessment of Incontinence Pads: Reusable and Disposable

Among many benefits, this study found that facilities that use reusable incontinence pads can reduce their waste stream by 97%.

By Evan Griffing, PhD, and Michael Overcash, PhD

The latest contribution to ARTA's library of life cycle assessments (LCAs) on key textile products is the "Life Cycle Environmental Assessment of Incontinence Pads," comparing reusable and disposable products. This LCA of reusable incontinence pads was compared to that of disposable incontinence pads on a cradle-to-end-of-life

basis. The functional unit was 1,000 reusable pad uses. Environmental performance metrics used for comparison were (1) Total fossil energy resources (2) Fossil resources combusted for energy (3) Global warming potential (carbon equivalents) (4) Blue-water use (water loss) (5) Solid waste generation.

Results

Disposable pads are generally known to be used at a higher frequency than reusable pads,

and this study found that 2.12 disposable pads are used per each reusable pad on an adjusted patient day (ADP) basis. Therefore, 2,120 disposable pad uses were compared to 1,000 reusable pad uses. Reusable pads achieve better environmental performance than disposable pads in all categories.

When compared to disposable pad use, reusable pads were found to:

1. **Save 71%** of fossil resources
2. **Result in 52%** less fossil resources combusted for energy
3. **Result in 56%** less water loss (blue water savings)
4. **Result in 61%** less carbon equivalent emissions
5. **Generate 97%** less solid waste at laundry or healthcare facility

Two parameters found to vary significantly from site to site were the number of laundry cycles for each new reusable pad before replacement and the number of pads used per adjusted patient day. Scenario analyses were done to check how the results depend on these parameters within the ranges observed. In each scenario, the reusable pads were superior or about equal to the disposable pads in each category.

Additional findings and assumptions

The market for reusable pads includes both polyurethane (PU) and polyvinyl chloride (PVC) barrier pads. The market was determined to be about 48% PU and 52% PVC, and these life cycle results reflect this market.

These pads have a rayon/polyester absorbent layer, a PU or PVC barrier layer, and polyester top and bottom layers. The representative pad was a nominal 34-by-36 inches and the weight was found to be 433 g/pad. The disposable pads were represented by a typical architecture based on a superab-

sorbent polymer/cellulose soaker with a polyethylene barrier and non-woven polypropylene top and bottom layers. The representative pad was a nominal 30-by-36 inches and the weight was found to be 144 g/pad.

The functional unit selected was 1,000 reusable pad uses. The reusable pads were found to be used an average of 46 times before being removed from service. The pads were often transferred with a patient and may have achieved additional use. When pads were removed from service by the laundry, these pads achieved an average of 75 uses.

The life cycle results are based on 46 uses, and 21.7 new pads were manufactured per 1,000 reusable uses.

KUDOS!

ARTA Incontinence Pad LCA Committee

Many thanks to members of the ARTA Incontinence Pad Life Cycle Assessment (LCA) Committee who provided invaluable support and insight into the manufacture and use of reusable and disposable incontinence pads.

Beck's Classic — Steven Beck, Jeff Bloom, Greg Mitchell

Cooley Group — Paul Helsby, Kasper Van Veen

Encompass — Steve Berg, Kristy Warren

George Courey — Jeff Courey

IAHTM — Christi Carper

London Hospital Linen — Brendan O'Neill

Medline — Dan Sanchez

MIP — Gabriel Boardman, Chair

Phoenix Textiles — Mike Hayes

Standard Textile — Cecil Lee, John Wintz

Virginia Hospital Laundry — Meredith Bowery

The average number of reusable pads per adjusted patient day was found to be 0.69 pads / ADP. The disposable pad use rate was 1.46 pads / ADP.

Therefore 2,120 disposable pads were assumed to be used to achieve the same functionality as 1,000 reusable pads.

The end of life was a mix of landfill and incineration for the pads. These pads are mostly polymer, so the end-of-life landfill : incineration ratio was based on the typical ratio for plastics in the United States (83% landfill and 17% incineration). The pad soil was treated in the wastewater treatment plant for reusable pads and the landfill and incineration facilities for disposable pads.

This study was conducted with technical contributions and financial support from the ARTA Incontinence Pad LCA Committee. The Committee consists of 11 organizations and 17 experts, covering the manufacturers, suppliers, product design, and laundry operations supporting reusable and disposable pads.

Drs. Evan Griffing and Michael Overcash are with Environmental Clarity and have conducted several other LCAs, including those for cleanroom coveralls, isolation and surgical gowns, and surgical drapes.

Members can download an 8.5 x 11" copy of this infographic at www.ARTA1.com.

THE ARTA-ENVIRONMENTAL CLARITY LIFE CYCLE ASSESSMENT OF INCONTINENCE PADS REUSABLE & DISPOSABLE

LIFE CYCLE METRICS

The life cycle assessment (LCA) of reusable incontinence pads was compared to that of disposable incontinence pads on a cradle to end of life basis. The functional unit was 1000 reusable pad uses. Environmental performance metrics used for comparison were:

- (1) Total fossil energy resources
- (2) Fossil resources combusted for energy
- (3) Global warming potential (carbon equivalents)
- (4) Blue water use (water loss)
- (5) Solid waste generation.

RESULTS

When compared to disposable pad use, reusable pads were found to result in:

- 71%** Fossil resources savings
- 52%** Less fossil resources combusted for energy
- 56%** Less water loss (blue water savings)
- 61%** Less carbon equivalent emissions
- 97%** Less solid waste at laundry or healthcare facility

REUSABLE VS. DISPOSABLE LCA ASSUMPTIONS							
	Architecture and materials	Size	Weight	Average number of uses	Average pads per adjusted patient day (ADP)	Number of units, frequency of use	Timeframe and disposal
Reusable Pads	Rayon/polyester absorbent layer, polyester top and bottom layers, and polyurethane or poly-vinyl chloride barrier layer	34" x 36"	433 g/pad	46	0.69 ADP	1/ADP 1,000	Cradle to end of life (83% landfill, 17% incineration)
Disposable Pads	Superabsorbent polymer/cellulose soaker with a polyethylene barrier and non-woven polypropylene top and bottom layers	30" x 36"	144 g/pad	1	1.46 ADP	2.1/ADP 2,120	Cradle to end of life (83% landfill, 17% incineration)

Study funded by the ARTA Incontinence Pad LCA Committee
 The American Reusable Textile Association (ARTA) mission is to promote greater appreciation for reusable textiles.
www.ARTA1.com

WHY IS PEER REVIEW IMPORTANT?

Peer review is the standard that determines whether research, a study, or literature review is considered scientifically valid. Without the peer-review process and stamp of approval, data is considered anecdotal.

ARTA is building a library of peer-reviewed research on textile products, which allows the textile services industry to irrefutably claim that reusable textiles are the sustainable choice — because the future is NOT disposable! This is important and will become even more important as water shortages continue and companies come under pressure to demonstrate their compliance with sustainability guidelines.

Check out ARTA LCAs and studies at www.ARTA1.com.

Questions? Contact Nancy Jenkins at njenkins@ARTA1.com