Energy Efficient Electric Hand Dryer Conversion in UCSB's High-Use Restrooms

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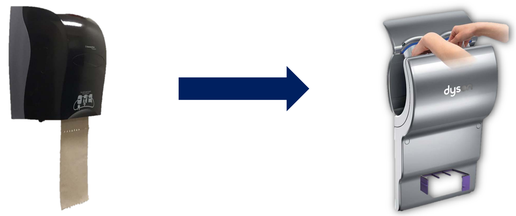
Abstract

Energy efficient electric hand dryers provide a quick, sanitary, and waste-free alternative to paper towels. They use less water, and emit less carbon dioxide across their life span than does the process of creating and disposing of paper towels. As proven by the success of two previously awarded TGIF grants for hand dryers in the Library (2013) and Bren Hall (2015), transitioning restrooms from paper towel dispensers to energy efficient electric hand dryers is a cost-effective means of reducing UCSB's environmental impact, with the potential of contributing points towards LEED EB: O&M credits. By converting 10 of the highest use restrooms near lecture halls in Girvetz, Physical Sciences Building North, North Hall, and Chemistry from paper towel dispensers to energy efficient electric hand dryers, this project will yield annual savings of nearly $10,000, waste reductions of over 13,000 pounds, carbon emission reductions by 76%, and a payback of just over 3 years.

The Hand Dryers

21
Paper Towel Dispensers

18
Dyson Airblade Dyers

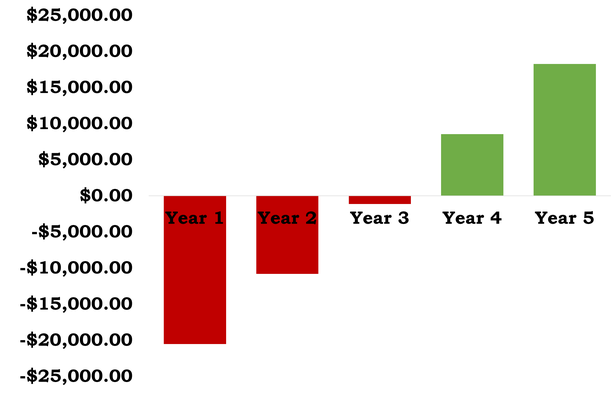


HYGIENIC
- Certified by NSF and HACCP International
- HEPA filter captures 99.97% of particles the size of bacteria down to 0.3 microns in washroom air[1]
- Antimicrobial additive to prevent bacterial growth
- Touch free

EFFICIENT
- Low power demand
- Fast dry time (12-14 seconds)[1]
- Unheated air
- Digital motor

Payback Period

Conversion of the four restrooms in Girvetz alone will generate an annual savings of $8,660.79. This substantial savings offsets the longer payback of the restrooms in PSBN, North Hall, and Chemistry. Conversion of all 10 restrooms is expected to pay off in 3.1 years.



Environmental Impact

According to a life cycle assessment commissioned by Dyson and carried out by MIT, the significantly greater environmental impact (notably in terms of global warming potential, water consumption, and cumulative energy demand) associated with paper towels derives from the production phase of the paper (recycled or virgin), rather than the packaging, dispensers, waste bins, and liners, which cumulatively account for only 10% of the impact.[2]

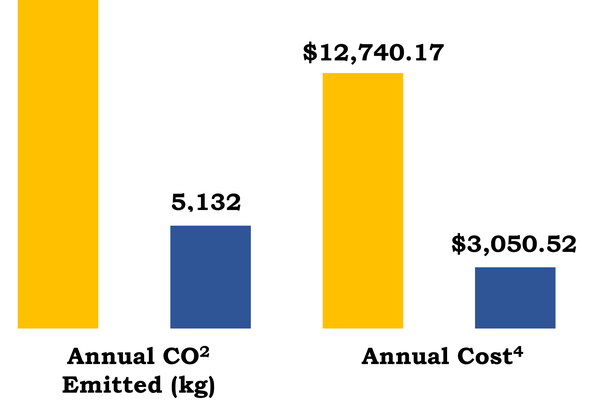
Conversely, the major impact of the Dyson Airblade results primarily from its use phase. However, due to its fast dry time and efficient motor, this impact is less than half that compared to recycled paper towels in nearly every impact category assessed. This TGIF project furthers UCSB's commitment to Zero Waste by 2020, while simultaneously reducing the often neglected scope 3 emissions and upstream impacts resulting from the harvesting of trees, transportation of lumber, pulping, and chlorination required for paper towel production.

Annual Reductions

WASTE
- **12,442 pounds**, or almost **500 miles** of paper diverted from the landfill [3]
- **734 pounds** of cardboard packaging diverted from recycling facilities

CARBON
- **76% reduction** in CO^2 emitted based on Dyson data that Airblade dryer emits only 3.3 grams of CO^2 per dry as opposed to 13.9 grams CO^2 emitted from paper towel use per dry [1]

COST
- **$9,689.65** saved annually



Acknowledgments

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NOTES & REFERENCES

[1] Dyson Airblade Product Brochure. https://oldmedia.dyson.com/medialibrary/Commercial_V5/Downloads/ProductBrochure/V-quiet/DYSON_256A_RANGE-BROCHURE_US.pdf

[2] Montalbo, Trisha, Jeremy Gregory, and Randolph Kirchain. Life Cycle Assessment of Hand Drying Systems. Tech. Materials System Laboratory, Massachusetts Institute of Technology, 19 Sept. 2011. http://msl.mit.edu/publications/HandDryingLCA-Report.pdf

[3] Based on annual paper towel use estimation by Byron Sandoval and paper towel manufacturer product specs

[4] Dryer utility costs calculated based on electricity cost of $0.11/kWh, Dyson reported standby and rated power of 0.5kW and 1.4kW respectively, conservative dry time of 15 seconds, and 2 sheets per hand dry; paper towel costs include clogged plumbing repair costs, paper towel purchases, and waste hauling fees.