

Name: Michelle Lee Bravatti

Is this a project that you will work on alone, or will you collaborate with others? If you are collaborating with others, list their names, their Tufts affiliation, and their contact emails. Please indicate which member of your team will be the principle contact.

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Please provide a 300-350 word description of your project

The pilot Air Jet Hand Dryers in the M&V Building proposal involves: 1) Removing paper towels and trash bins from high-traffic restrooms in M&V building 2) Installing air jet hand dryers (Exlerator Eco) in these restrooms This change will reduce: -Labor (changing paper rolls and taking out trash in restrooms), -Dependence on paper products and plastic bags, -Paper waste, -Costs (the average cost of running such a hand dryer is ~\$2-10/yr), and ultimately reduce Tufts' carbon footprint.

What is the problem that you are looking to solve?

Currently, the majority of restrooms in the Health Sciences campus, with the exception of Sackler 4th floor, have paper towel dispensers installed. Paper towels in these restrooms are not composted, and end up in landfill. In the U.S. alone, 6 million tonnes of paper towels end up in landfill every year, taking approximately 2% of all landfill space in the U.S. The whole process of manufacturing, transporting, dispersing, and disposing of paper towels is resource-intensive, expensive, wasteful and not sustainable: -Trees are chopped down -Paper pulp needs to be created, cleaned and bleached- (water- intensive process) -Transportation (use of fossil fuels) -Ordering, stocking, lining and removing plastic bags with paper towels (labor-intensive) -Bags take up space in landfills or are incinerated- (increasing CO₂ emissions) *This is not in alignment with Tufts Strategic Plan or its role as a leader in environmental sustainability, and Tufts is in need to take action.

Has this been done before? How is this project different?

No.

How would you sustain or expand the project after the pilot has ended?

Depending on the feedback from M&V Building faculty, staff, and students and custodians, as well as the cost savings from Facilities, it will be determined how much air jet hand dryers are cost-effective and energy efficient, along its environmental

impact, and whether it will be worth to change all paper towel dispensers to air jet hand dryers in high-traffic restrooms in other buildings in the Health Sciences Campus.

How will you measure success?

We will measure success through: • Surveys and feedback from faculty, staff and students, and custodians from the M&V Building • Reports from Facilities, in terms of electricity used and costs, and savings from paper towel use.

How many people would this project impact? Please categorize them as students, faculty, staff, and other

All faculty, staff, students in the M&V Building, who use the restrooms (14 departments in this Building).
o Approximately ~15 faculty+ staff per department= 210
o Students who potentially have class in this building (800 medical students, 150 physician assistant students, 400 MS or MPH students)
• Approximately 5-10? Custodians who clean the restrooms in the M&V Building
• Total of people potentially impacted: ~1570

What is the environmental impact?

For each XLERATOReco that is used 200 times per day, the environmental savings are as follows: Annual Climate Change Benefits (kg CO₂ Eq. reduced): 1,727.22 kgs. Pounds of Paper Towel Waste Eliminated: 804.25 lbs Percent Reduction of Carbon Footprint: 81.25% Trees Saved: 6.84 Cubic Meters in Landfill Saved: 1.21 Gallons of Water Saved: 2,814.86 gals. Emissions Saved from # Gallons of Gasoline: 193.45 gals For the 8 XLERATORecos installed: Annual Climate Change Benefits (kg CO₂ Eq. reduced): 1,727.22 kgs.*8=13,817.76 kgs Pounds of Paper Towel Waste Eliminated: 804.25 lbs*8= 6,434 lbs Percent Reduction of Carbon Footprint: 81.25% Trees Saved: 6.84*8= 54.72 Cubic Meters in Landfill Saved: 1.21*8=9.68 Gallons of Water Saved: 2,814.86 gals.*8=22,518.88 Emissions Saved from # Gallons of Gasoline: 193.45 gals*8=1,547.60 gals

What are the educational impacts of this project?

The educational impacts of this project are: 1) To raise awareness about the damaging environmental impact of paper towels a. Paper towels take up approximately 2% of all land fill space in the United States b. The whole process of manufacturing, transporting, dispersing, and disposing of paper towels is resource-intensive, expensive, wasteful and not sustainable. 2) Present air jet hand dryers as a more environmentally friendly alternative to paper towels a. Cost effective: ~\$10 annual operational costs b. Percent reduction in carbon footprint: ~81%

What is the social impact (excluding educational aspects)? (e.g. alleviating climate injustice, community resiliency, culture change, equity, etc)

The social impact of this project is to bring an infrastructure change to Tufts University that will allow the use of air jet hand dryers to become the norm. Although it is not feasible or cost effective to replace all paper towel dispensers with air jet hand dryers, it is possible that this change can bring about positive behavior change. For example, some faculty, staff or students will become more aware of the detrimental environmental impact of paper towels and may choose to go to restrooms that have air jet hand dryers instead, just because they know that they are better for the environment. This behavior change can extend to behavior outside the university, which can also have an influence on family members and friends.

Will it help Tufts meet its sustainability goals? If so, how?

This project will help Tufts maintain their position as a leader in environmental sustainability, by conserving energy and reducing emissions, water use and waste per Tufts Strategic Plan (2003-2013), which builds on the 1988 Talloires Declaration. This project also will reduce Tufts greenhouse gas emissions in order to reach carbon neutrality by conserving energy and minimizing the use of fossil fuels by saving trees, landfill space, gallons of water, emissions from use of gasoline for transportation of paper towels, and carbon emissions from taking up landfill space. Furthermore, it will help with Tufts' goal of 3% reduction of waste per year, in terms of paper and energy waste. Lastly, it will help with Tufts' goal of reducing energy consumption 5 to 7 percent per year that was established in 2013 with additional targets in 2016, since air jet hand dryers are very energy-efficient.

What are the life cycle cost savings or the immediate cost savings, if applicable?

When purchasing eight XLERATOReco hand dryers and assuming that each hand dryer gets used 200 times per day, the return on investment for the eight hand dryers is 23 months (less than 2 years). The annual costs of using paper towels is significantly higher compared to the annual costs of operating the hand dryer, \$2850 vs. \$10.13, respectively. The annual cost savings for switching from paper towels to XLERATOReco is ~\$2840 per year, which is 99.6% annual savings. Please see below, how the numbers were calculated: 1. Number of Cases of Paper Towels Used Annually: 38 2. Cost per Case Delivered (include Freight and Tax) (typically \$15.00 - \$25.00/case): 50 3. Number of Towels per Cases: 4800 (4,800 linear ft/case for Roll Towels) 4. Your kWh Rate: 0.10 (typically \$0.10 per kWh) 5. Total Paper Towel Costs per Year: \$1,900.00 6. Handling Cost: \$950.00 (50% of item Total Paper Towel Costs - Includes the cost of generating requisitions and purchase orders, receiving, storing, servicing towel dispensers, collecting and disposing of used towels.) 7. Total Cost Of Using Paper Towels Per Year: \$2850.00 8. Number of Paper Towels Used Annually: (38 cases* 4800 towel/ case)= 182,400 paper towels 9. Number of Hand Dryings Annually: 182, 400 paper towels/ 2.5 towels per hand dry= 72,960 10. Hours of Hand Dryer Usage: (Use 360 hand dries per hour for XLERATOReco®): 72,960/360= 203 hours 11. Cost of Electricity per Hour: (Use 0.5 kW for XLERATOReco®): 0.05 kW/ hour 12. Total Annual Hand Dryer Costs: 0.05 kW/ hour* 203 hours= \$10.13 13. Annual Savings: \$2839.87 14. Percent savings: 2839.87/ 2850= 99.6% <https://www.exceldryer.com/calculator-long/>

cases=95&towels=4800&costs=50&kwh=0.10&perdryer=430.00&install=250.00&num
dryer=8.33&uses=500

How much funding are you requesting from the Green Fund? Are you seeking funding from other places?

Total funding requested is up to a maximum of \$6,868. This number depends on whether or not we are able to obtain the XLERATOReco at wholesale price, and if Facilities has internal employees who can install the hand dryers, further reducing the total costs of the project. We will also be requesting Facilities to replace Purell refills outside of restrooms as needed, it seems like they already do so for other buildings.

1) A letter of support is currently being requested from Tufts Facilities. I will send an email with an attached presentation, and template for a letter of support to the Director of Facilities and interested parties.

2) Potential issues:

a. **Increased energy waste:** The air jet hand dryers that were picked for this project are very energy-efficient, thus will not increase energy waste. In fact, they reduce carbon footprint by 50-75% and uses 80% less energy than conventional hand dryers. This hand dryer also doesn't use heat and uses only 500 Watts. For information you can also see the description of the dryer (<https://www.exceldryer.com/product/xleratoreco-hand-dryer/>)

b. **Some consider paper towels more sanitary** (and often use them to open the bathroom door): In terms of paper towels being "more sanitary", it depends on the setting and who actually funds the research studies. In settings where hygiene is paramount and very important such as hospitals and clinics, paper towels should be used, but in other settings, air jet hand dryers are okay.

(1) Results from most of the research is conflicting and varies depending on who funds the studies (Hand dryer or paper industry). In a non-industry funded randomized control trial, there was no difference in 4 methods (cloth towels from rotary dispenser, paper towels from a stack on the hand-washing sink, warm forced air from a mechanical hand-activated dryer, and spontaneous room air evaporation) of removing bacteria from washed hands.

(2) i. For those who open bathroom doors with paper towels, there are some solutions:

1. Solution 1: If the Americans with Disabilities Act (ADA) allows, change direction of door (to push vs. to pull from the inside)

a. This is also a fire hazard, doors should be push from inside

b. Coordinate change with Facilities

2. Solution 2: Add pull handle so that it allows the user to open door using forearm (\$94 each)

<https://www.restroomdirect.com/sanitary-door-opener.aspx>

3. Solution 3: No change, and place hand sanitizer dispensers outside restroom doors (3) *Solution 3 may be the most simple and cost-effective solution References: (1)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538484/> (2)

[https://www.mayoclinicproceedings.org/article/S0025-](https://www.mayoclinicproceedings.org/article/S0025-6196(11)64617-X/fulltext)

[6196\(11\)64617- X/fulltext](https://www.mayoclinicproceedings.org/article/S0025-6196(11)64617-X/fulltext) (3)

<https://laforceinc.wordpress.com/2016/08/22/2687/>

c. Water on the floor causes more work for the custodial staff: This would only be true for very high-traffic bathrooms and if the hand dryers are placed very distant from the sinks □ Solution: install recess kit that will keep water from walls and floors (\$162) and place hand dryers close enough to sinks.

d. We would also like to see a plan of incorporating outreach and communications with building users.

i. As a research assistant in the Department of Public Health and Community Medicine, I am well acquainted with faculty and staff

1. Send a survey via email to assess support for air jet hand dryers

2. Pitch idea at department events and talks

3. Send updates about project

4. Send a follow-up survey to assess how the air jet hand dryers are working for faculty, staff and students in the M&V building, and ask for input as well as support for next steps (implement in other buildings?)

ii. Survey custodial staff about changes

1. Does it alleviate their work load and allots them more time to focus on other tasks?

2. Are floors wet and create more work for them? Which floors? What are their recommendations?

iii. Can you provide additional information on the \$28/year operating cost?

The \$28/ year operating cost was a rough estimate. After further calculations, the actual

annual operating costs of XLERATOReco is ~\$10/ year per dryer.

[https://www.exceldryer.com/calculator-long/?](https://www.exceldryer.com/calculator-long/?cases=95&towels=4800&costs=50&kwh=0.10&perdryer=430.00&install=250.00&numdryer=8.33&uses=500)

[cases=95&towels=4800&costs=50&kwh=0.10&perdryer=430.00&install=250.00&numdryer=8.33&uses=500](https://www.exceldryer.com/calculator-long/?cases=95&towels=4800&costs=50&kwh=0.10&perdryer=430.00&install=250.00&numdryer=8.33&uses=500)