

## Sustainable Restroom

### ENVS 4100: Appropriate Tech & Sustainability

Kevin Looney  
734-778-2209

Kevin.P.Looney@wmich.edu

Shannon Patterson  
269-655-5270

Shannon.I.patterson@wmich.edu

Zachary Santen  
513-378-4344

Zachary.W.Santen@wmich.edu

#### **Abstract:**

The goal of this project was to determine the best practices for a more sustainable restroom that could be implemented in future buildings on Western Michigan University's campus. We believe that by implementing more sustainable practices in restrooms on campus Western Michigan University can take one more step towards a more sustainable tomorrow.

#### **Methodology:**

To begin our project we researched current practices at WMU. With this information we then began to research the most sustainable options for toilets, vanities, and hand drying techniques. We compared the various options for toilets, vanities, and hand drying techniques by creating a list of cost and benefits for each option. Using this method allowed us to quickly and easily see the advantages and disadvantages of each option.

#### **Conclusion:**

After reviewing all of the options for toilets, vanities, and hand drying techniques through the cost benefit method we determined the best practices for future restrooms. When exploring the best option for toilets we determined the most sustainable option is the composting toilet. Using the

Composting system creates zero waste and allows for the organic matter to be converted into a fertilizer that could be used across campus by landscaping toilet. Composting toilet systems are very expensive and built into the design of the building. In addition these systems require significantly more maintenance than traditional toilets. However even with this issues noted the composting system is by far the most environmentally friendly with all waste being managed on site instead of in a wastewater treatment plant.

For hand-drying methods we determined that best option was cloth roll towels. They were the most sustainable option for future bathroom use. Pending further information regarding service from CLS here in Kalamazoo, cloth roll towels are cheaper than all other options in unit price. CRT's produce no waste as opposed to paper towels. The carbon footprint of cloth roll towels is less than paper towels and both forms of hand dryers. Cloth roll towels do not have the complete, 1 time installation cost saving advantage that hand dryers do, but with a company that provides cloth roll towel service right here in Kalamazoo, we determined that cloth roll towels would be the most sustainable hand drying option.

The final best practices for a vanity set up including faucets, sinks and countertops are, sensory activated faucets, stainless steel sinks and Corian countertops. We chose the sensory activated sinks because they meet the EPA water sense low flow standard, are certified low lead compliant, eliminate bacteria transfer and lower the chance for wasted water with their motion sensor activation. The stainless steel sink type was chosen after reviewing an article on bioadhesion that confirmed stainless steel requires a less concentrated cleaning solvent to remove bacteria efficiently making cleaning and maintenance of the sinks more environmentally friendly. Finally for the countertops the best option was the Corian, this type of countertop has the bacteria resistance we wanted, is durable and is composed of 6 to 20% recycled material making it the most sustainable option.

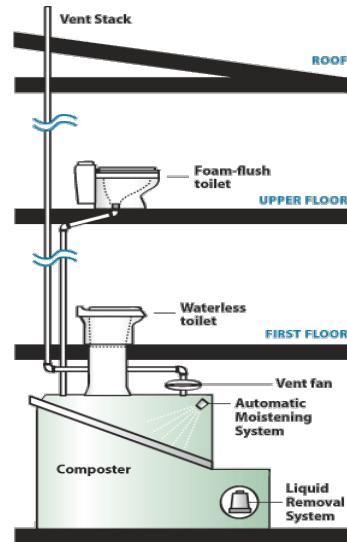
---

### Composting Toilets:

Of the options we researched composting toilets were the best and most sustainable option for our restroom renovation this is because it is a zero waste system. All organic matter that is deposited into that system is composted and can be used as a fertilizer on WMU's campus. The composting of the waste means there is no need to connect to potentially environmentally damaging wastewater treatment plants.

---

### Commercial Composting Toilet System



---

### Hand Drying

We determined the Xlerator Eco high speed hand dryer, of the options available, to be the most sustainable option. It requires less electricity to power than all other hand dryers, clearly uses less resources than paper towels, and uses overall less energy than what would be needed for cloth roll towels. All of this combines to the lowest carbon footprint among the options researched. It has a relatively low unit cost and

### Example of Xlerator Eco



---

### Vanities:

Counter tops: Corian this type of counter top has the bacteria resistance, high durability, is inexpensive at 40 to 60dollars per square foot and Corian is made partially of recycled material.

Faucets: The sensory activated faucets were the best decision based on our cost benefit analysis. The low lead chrome materials cut down on the change of chemical contamination as a direct result from the faucet; EPA water sense certification satisfies the low flow standard for a more sustainable faucet type and the sensory activation for water turn on and off eliminates wasted water during inactivity in the restrooms.

Sinks: For the sink types, stainless steel stood out as the best option after reviewing the paper published in the Journal of bioadhesion and biofilm research that determined stainless steel required a less concentrated cleaning solvent to remove bacteria efficiently (Peterman 2009) making cleaning quick easy and ecofriendly.

---



Examples of Corian countertops, Sensory activated faucets and Stainless steel sinks