

Green Clean Schools



Healthy Cleaning for Students, Staff and the Environment

Step 3: Introduce Green Equipment + Supplies

Five Steps to Green Cleaning in Schools

GreenCleanSchools.org

Step 3: Introduce Green Equipment + Supplies

Equipment selection is a huge part of a green cleaning program. Today's tools can reduce chemical use and increase productivity. Improvements in ergonomics should also help custodians avoid injuries. Even though green equipment may initially cost slightly more than traditional options, schools can actually save money on labor and health care costs in the long run.

Use of green equipment and supplies can also reduce exposure to dust and chemicals while cutting energy and water use. Examples include:

- Vacuum cleaners with high-efficiency filters that capture microscopic materials which can harm health or damage sensitive equipment
- Floor burnishers with vacuum attachments that capture the dust created during use and can protect against exposures to heavy metals
- Auto scrubbers and carpet extractors that reduce water consumption, chemical use, slip-and-fall accidents and mold growth
- High-quality entryway mats that reduce dirt contamination
- Microfiber dusting and mopping systems
- Remodeled restrooms that use touch-free bathroom fixtures, waterless urinals and automated faucets to save water
- Mechanical floor scrubbers that reduce the need for chemicals
- Water-based cleaning equipment to reduce the need for chemicals in general purpose cleaning

When purchasing green equipment and supplies, schools should consider three factors: appropriateness, effectiveness and usability.

Every day, cleaning equipment design is being improved to be more energy efficient and to use less water and detergent.

Appropriateness

Tools should match the job. For example, when choosing a vacuum cleaner, a 12-inch, single motor upright vacuum to clean a 10,000 square-foot auditorium is a losing proposition. It

is too small and too time consuming. Cleaning a crowded classroom with a 42-inch-wide area vacuum cleaner is also a losing proposition. The large size makes cleaning around desks and chairs equally difficult and time consuming. Before purchasing equipment, identify spaces and flooring surfaces that need to be cleaned. Then, choose appropriately sized and designed equipment.

Effectiveness

Consider how well the equipment removes and prevents contamination from soil, water, dust and other contaminants. Here are some basic guidelines for choosing common school cleaning equipment.

Vacuums

Vacuums should be certified by the Carpet and Rug Institute's Green Label certification program and operate at a sound level below 70 dBA. The program's criteria include:

- Soil removal: The vacuum must remove a defined quantity of soil from the carpet in four passes.
- Dust containment: The vacuum must not release more than 100 micrograms of dust particles per cubic meter of air. This protocol evaluates the amount of dust particles released by the brush and rolls through the filtration bag and via any air leaks from the system. It is more stringent than the National Ambient Air Quality Standards.
- Carpet appearance retention: The vacuum should not deteriorate the carpet's appearance.

Backpack Vacuums

Selecting lightweight, ergonomically designed equipment is very important. Heavy, poorly designed equipment can cause fatigue,

cleaning inefficiencies and back injuries. For example, backpack vacuums weighing less than 10 pounds allow for fast, efficient movement and handling on both carpet and hard floor surfaces. They minimize back injuries to custodians better than heavy, poorly balanced upright traditional vacuum cleaners. Backpack vacuums with extension wands also allow for dusting ceilings, walls, fixtures and high ledges. Removing dust, rather than stirring it up through conventional dusting and dust mopping, will improve indoor air quality.

Carpet Extractors

The Carpet and Rug Institute has several levels of certification for carpet extractors. Deep cleaning carpet extractors should be certified by the **Carpet and Rug Institute's Seal of Approval** program.

Both portable and truck-mount carpet extractors should be evaluated on their ability to remove soiled water from the carpet or upholstery. The Carpet and Rug Institute recommends carpet should be dry within 24 to 48 hours. Considering moisture, for example, is key to choosing an extractor, because:

- Wet or damp carpet is a safety hazard, creating potential slip-fall accidents
- Wet or damp carpets and upholstery are breeding grounds for bacteria, mold and fungi. The faster the fabric dries, the less opportunity for substantial growth.
- Any moisture left in the fabric is, by definition, dirty. Soils are emulsified and suspended in the water. If the water is not removed, neither is the soil. Therefore, the longer a fabric takes to dry, the less cleaning is actually performed.

Carpet cleaning systems that work on dry powder systems have also been developed. These present a good alternative to wet carpet extraction. This may be preferred, especially for schools in humid climates, to reduce the potential for mold growth.

Automatic Scrubbers

Automatic scrubbers use less water and chemicals. They use foam or microfiber pads or new scrubbing machines that use only tap water with no added chemicals. Automatic scrubbing machines can also be equipped with variable-speed feed pumps and on-board chemical metering to optimize cleaning fluids. An effective squeegee design helps recover **more water and prevent "trails" that need to be hand-mopped.** This helps avoid potential falls and improves productivity.

Floor Care Systems

Overall, floor care should be considered a system. The floor finish needs to match the stripper and the recommended cleaner and maintainer. Implementing a floor care program that reduces burnishing, recoating, stripping and refinishing can have significant environmental and health benefits. Imagine not only the environmental and health benefits but also the cost savings in products and labor if stripping and recoating can be reduced from twice a year to once every two to three years.

Most traditional floor finish strippers have a Volatile Organic Compounds (VOCs) level higher than 10 percent and commonly between 15 and 30 percent. A green floor finish remover, by contrast, may have a VOC content of 6 percent or less and still be effective in removing finish. In addition to reducing or eliminating toxic ingredients from floor finishes and strippers, a floor care system can be made environmentally preferable by increasing finish durability, reducing the need to strip and recoat frequently.

Burnishing equipment should include active vacuum guards or other devices for capturing fine particulates and preventing them from being inhaled. Burnishing is an abrasive process, like sanding, which creates a tremendous amount of dust. Capturing this dust has the added benefit of reducing the amount of dust in the air, which can improve cleaning productivity because less dusting will be required. All floor care equipment should operate at a sound level of 70dBA or less.

Many schools are moving toward using abrasive floor pads instead of chemicals to strip old floor finishes for recoating. Eliminating the use of chemicals has enormous environmental and health benefits, including the prevention of VOC exposure to building occupants and custodians. Abrasive floor pads are also cheaper and faster than chemicals.

Floor Pad Selection

As stated above, floor pad selection is an important component when considering your floor care system. With the proper floor pad, a school can reduce chemical use as well as enhance the market for recycled plastics. It is estimated that 50 million floor pads are discarded annually in the US, so efforts to extend the life of floor pads and purchasing pads with high levels of recycled content can support your sustainability goals. When purchasing floor pads, considerations include:

- Recycled content. While standard floor pads are generally constructed of plastic fiber, some are made using up to 100% recycled PET plastics, diverting plastic from the waste stream.
- Consider the system. Floor pads should be used as part of a system to maximize efficiency of the product in use. The right combination of equipment, pad and chemical can reduce (or eliminate) chemical use and potential exposures.
- Consider the life cycle of your floor pad. Some floor pads on the market can break down in landfills freeing up critical landfill space.

Additionally, maintenance is an important part of how long your floor pads can last. The single most important factor in achieving the full expected life of a floor pad is how they are cleaned. Floor pads should be cleaned after every use by spraying the pad to remove soil, and then hanging to dry. Improper care of floor pads can dramatically reduce their effective life.

Spray and Vac “No Touch” Cleaning Systems

This equipment includes both a high-pressure washer with a wet/dry vacuum to make cleaning

in bathrooms faster and more efficient, while reducing chemicals.

Vapor Cleaning Devices

Steam vapor equipment offers a chemical- and toxic-free approach using only tap water. These products can remove mold, mildew and several pathogens, including MRSA. Disinfecting equipment, including steam vapor equipment, should be manufactured by companies registered with the EPA and have an EPA-assigned establishment number.

Additionally, LEED-EBOM (the USGBC's maintenance standard for existing buildings) requires the following:

- Propane-powered floor equipment must have high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board (CARB) or EPA standards for the specific engine size and operate with a sound level of less than 90 dBA.
- Battery-powered equipment must use environmentally preferable batteries.
- Powered equipment must be ergonomically designed to minimize vibration, noise and user fatigue.
- Equipment must be designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.

Usability

The most powerful vacuum cleaner in the world **won't clean a thing if it stays in the closet.** To evaluate usability, ask the manufacturer the following questions:

- Is the equipment ergonomically designed to prevent injuries?
- Is the equipment the appropriate size **and type for the school's typical** custodian and his or her capabilities?
- Is the equipment difficult to operate or **maneuver? Don't be misled by** marketing puffery and productivity claims. Actually try the equipment in circumstances similar to those found in your school.

- Can an average user figure out how to use the equipment with minimal instruction? What sorts of training materials are required and available for the equipment? How about a non-English speaking user? Are the labels clear: Do they use icons or colors as cues? Is there a “panic” switch to protect the user or passersby?
- What is the service record for this equipment? How long has it held up in similar situations to those found in your school? If it is a new piece of equipment or design, what is the **company’s track record with their other equipment?**
- Are parts and service readily available? What is the warranty?

- Cloths for hand dusting can replace traditional rags and furniture polish.
- Mops that capture more dust, last longer and require no treatment can replace traditional dust mops. Flat mops clean better and last longer than traditional looped cotton mops.
- Pads for floor machines can be used on hard or carpeted floors.

Color-coded microfiber systems also reduce cross contamination. Always follow the **manufacturer’s instructions for laundering** microfiber products to help them last.

Select Green Cleaning Supplies

Use these general guidelines to choose supplies that enhance your green cleaning program. And be sure to also read our [Food Service and Infection Control sections](#) for more guidance on how equipment choices affect these areas.

Cleaning Tools

Durable supplies made from recycled content

Plastic carts, buckets, wringers, mop handles and other durable tools that use post-consumer recycled content can extend product life. This minimizes the frequency of replacement and the environmental impacts of manufacturing replacement products.

Reusable—rather than disposable—supplies

Reusable supplies can reduce or eliminate the need for water, chemicals or paper in the cleaning process. For example, clean glass and mirrors with squeegees rather than paper towels or use a plumber’s snake to unclog drains rather than pouring in concentrated acids.

Microfiber

Several types of dusting and cleaning cloths are now made from microfiber:

- Cloths for glass cleaning and general purpose cleaning require virtually no water or chemicals.

Other Everyday Supplies

Floor mats

Mats protect floors by stopping moisture and dirt at the door. They make floors easier to clean and reduce slipping. Look for entryway mats with the following traits:

- Properly sized, long enough to take at least four steps
- Designed for the ambient conditions
- Preferably PVC-free

Hand soaps

Select hand soaps with no antimicrobial agents (other than as a preservative), except where required by code or regulation. Studies have shown that antibacterial soaps are no better at preventing infections than plain soap. Alternatively, look for Green Seal or EcoLogo certifications for hand soap selection.

Hand soap dispensers

Reusable hand soap dispensers can be part of an overall hand hygiene program, but proper maintenance and use are important because they have been shown to be susceptible to bacterial contamination. According to CDC, to avoid this problem, proper maintenance includes the following:

- Do not add soap to a partially empty soap dispenser. The practice of **‘topping off’ dispensers can lead to contamination**

- Make sure you are following dispenser **manufacturer's recommended** maintenance procedures and protocols.
- Ensure refillable dispensers are lockable to help deter vandalism.
- Whenever possible, do not mix different soap brands or water into dispensers. This can jeopardize the preservative system.

Schools could consider sealed soap systems to eliminate these potential risks.

Hand sanitizers

Alcohol-based sanitizers reduce the number of bacteria present and can substitute for hand washing when faucets are not available. Some schools seek alcohol-free options because of concerns about alcohol-based hand sanitizers, including ingestion, flammability, odors and damage to finishes. There are alcohol-free options on the marketplace, but these have not been approved by the FDA or the CDC. Their long-term health and environmental impacts have not been fully studied. Traditional soap and water hand-washing is still preferred over hand sanitizers.

Hand Drying Tools

Most schools must choose between two hand drying options—paper towels or air dryers. For schools that choose paper towels, metered hands-free paper towel dispensers are healthier and more environmentally friendly than manual multi-fold paper towels. People tend to use less paper with the metered hands-free dispensers, which cuts down on paper waste and costs. They also reduce touch points that spread germs. In addition, paper towels wipe off dirt and germs that may not have been removed during the washing process.

For schools that use air hand dryers, select energy efficient hand dryers that effectively remove dirt and germs without spreading water droplets. Energy efficient air hand dryers can have a lower environmental impact because they virtually eliminate paper use and waste. They also reduce the environmental impact of transporting paper. However, hand air dryers also have higher upfront costs and require

students to take more time to line up and dry their hands.

Paper Products

When it comes to choosing green paper products, there are many important things to consider, including recyclable content, chemicals and waste.

However, before you start looking at product **choices, you'll want to evaluate the best ways** you can conserve paper use in general. By reducing the amount of paper your cleaning program uses, you'll not only help the environment, you'll also help your bottom line.

Paper Conservation (Source Reduction)

Consider how the right style of paper towel and type of dispenser can impact paper usage, waste, health, and cost:

- Use hands-free dispensers to eliminate spreading germs on cranks and levers.
- Buy larger rolls of toilet paper to reduce packaging waste, cost and labor to change the rolls. (It also cuts down on complaints that the toilet tissue dispensers are empty.)
- Replace multi-fold towel dispensers with roll towel products and hands-free dispensers to eliminate waste and save money on restocking labor.

Make sure to consider the costs for changing dispensers and find economical ways to address the change-over, using vendor assistance if possible. Be careful about paper quality. A higher-quality paper product can actually result in less product being used because more moisture is absorbed with less paper being used. This reduces both environmental impact and overall costs.

Choosing Green Paper Products

When it comes to green paper products, recycled content is a start. There are a number of other considerations, such as bleaching without chlorine and packaging. Greener paper is an important part of a green cleaning program but source reduction is a fundamental. Make sure you consider your current paper usage and

come up with strategies to not only use less, but also reuse what you have before you start purchasing more paper.

For paper products, you can choose among five different green third party certifications:

- EcoLogo
- Green Seal
- Chlorine Free Products Association
- U.S. EPA
- **U.S. Green Building Council's** recommendation for rapidly renewable paper products

The most significant criteria in selecting recycled paper are:

- Recycled Content: Addresses and encourages the use of recycled content, either post-consumer or other recovered materials.
- Minimum Post-Consumer Content: Specific minimum levels of post-consumer recycled content varies between rating systems and product type, but a good minimum is 20-40 percent.
- Elemental Chlorine Free: Pure chlorine may not be used to bleach the pulp.
- Processed Chlorine Free (PCF): No compounds containing chlorine may be used in the bleaching process.
- Rapidly Renewable Resource: Uses paper made from a crop that is planted and harvested within a ten-year period.

Tree Free Fiber is a newer sustainable paper alternative. Sources for tree-free fiber paper include agricultural waste, fiber crops such as hemp and flax, textile and cordage waste such as rope or cotton scraps and wild crops such as bamboo.

Choosing Green Plastic Products

Recycled plastic trash bags, also referred to as trash can liners, are widely available. The amount of recovered materials used in the manufacturing process is affected by the color, size, and thickness of the bag.

EPA Recommended Post-Consumer Recycled Content for plastic is 10-100 percent. There are three levels of recovered material content in

recycled plastic products, according to the EPA:

- High density polyethylene (HDPE): A plastic resin used in products and packaging such as milk jugs, detergent bottles, margarine tubs, and garbage containers;
- Low density polyethylene (LDPE): A plastic resin used for both rigid containers and plastic film applications such as plastic bags and film wrap;
- Linear low density polyethylene (LLDPE): A plastic that is used predominantly in film applications due to its toughness, flexibility, and relative transparency. LLDPE trash can liners typically have the best qualities of puncture resistance and thickness for school use. They are the ideal economical choice for larger garbage containers with refuse that has some sharp corners but is not extremely heavy.

Equipment Standards

Just like cleaning products, cleaning equipment is also certified by third party certifications that can help you make greener choices.

Vacuum Cleaners

The Carpet and Rug Institute certifies vacuum cleaners under its Green Label program. It also certifies extractors and carpet cleaning systems under the Seal of Approval program. Qualifying equipment must meet third party certifications for soil removal and dust containment and help retain carpet appearance. Extractors must effectively remove moisture. These are the only existing third party certifications for vacuums and extractors.

Laundry and Kitchen Equipment

The EPA's ENERGY STAR program certifies equipment based on energy efficiency improvements. Product categories include laundry washing machines and commercial kitchen equipment including dishwashers, ice machines and ovens.

Cost Comparison

Labor constitutes the largest component of a school's cleaning budget, especially when it comes to equipment. Investing in the right equipment and developing effective cleaning procedures cuts costs and boosts productivity. Green equipment tends to cost more, but with its higher quality and greater durability, it can be more cost effective in the long run. In most cases, the budget won't permit a school to replace all inappropriate equipment at once. But schools can identify priorities and establish a plan for phasing out lower quality, poorly performing equipment based on their needs.

Recycled paper tends to cost more than paper manufactured from virgin tree fiber. However, by taking a few simple steps to reduce consumption — such as replacing multifold hand towels with large rolls and replacing single roll toilet paper dispensers with dispensers that hold multiple rolls — you can offset the higher initial cost by reducing consumption. Also, staff save on time used to change bathroom tissue rolls by using larger rolls.

New & Emerging Technologies

Every day, new technologies are developed to save energy, reduce chemical use and aid worker efficiency. Inclusion in this guide does not imply an endorsement or certification. However, evaluating these technologies can contribute to your program's long-term success.

These new technologies can significantly benefit a green cleaning program. As relatively new products, many have limited availability. Considering the benefits of these products and look out for them as they become more widely available.

Water-Based Cleaning Technology

Equipment that converts tap water into a cleaning agent is a major breakthrough. Some of these equipments add salt to water to produce a cleaning agent while others infuse water with ozone. The resulting cleaning agent is sometimes strong enough to disinfect. These

technologies eliminate many health and environmental risks from manufacturing, packaging, transportation, storing and disposing of chemicals. Look for water-based technologies with the Green Seal certification. Water-based technologies are available from Tennant, Orbio and Ecologic Solutions, among other manufacturers.

Hand Dryer Improvements

New, more energy-efficient hand dryer designs allow faster drying, less noise, and microbe-resistant surfaces. The best new designs capture water from hands without spreading droplets around. Energy-efficient hand dryers are available through Dyson and Veltus.

Microfiber Integrated Floor Cleaning Systems

Improved microfiber mopping systems include a cleaning product dispenser integrated into the mop handle or an attached backpack. These systems reduce water and chemical use, minimize cross contamination by preventing the need to dip the mop into a dirty bucket, and use environmentally preferable cleaning products. Kaivac, Ecolab, and several other companies carry these types of products.

Rapidly Renewable Paper

Rapidly renewable resources can be replenished in three to five years. The construction industry has long since shifted to rapidly renewable products, such as bamboo flooring and wheat straw cabinetry. Now, the paper industry is following suit, using mixed tropical woods, acacia and eucalyptus trees. Rapidly renewable paper products are available through many companies including Unisource and Solaris Paper.

Spray and Vac Touch Free Cleaning Systems

Spray and Vac systems are self-sufficient cleaning units that hook into an external water supply or contain their own. Utilizing a hose and extension tools to access hard-to-reach places, these ergonomically-designed systems minimize worker exposure to contaminated

surfaces, reduce the use of chemicals and water, eliminate cross contamination, and use environmentally preferable cleaning products. Spray and Vac Touch Free Cleaning Systems are available through Kaivac and Hillyard.

Vapor Disinfecting Technology

Using steam instead of chemical disinfectants offers a non-toxic alternative by using just tap water to clean and disinfect. Steam vapor equipment should be manufactured by companies registered with EPA. It is available from the company Advanced Vapor Technology.

Waterless Urinals

Waterless urinals save in sewage costs and water — up to 40,000 gallons annually. The units prevent odor with vapor barriers and reduce maintenance and repairs. Some water urinals use surfaces made with 30 percent soybean resin, replacing petro-based material with a more environmentally friendly alternative. Waterless urinals are available through Ecotech Water, Zero Flush, Waterless Co., Kohler and Sloan Valve.

LED Lighting

Energy efficient light bulbs have become the norm, **and if your school hasn't made the switch** it might be time you do. LED lighting can greatly help your building reduce energy and save money. By using LED lighting, you can save **money on the school's overall utility bills and** then reinvest those savings in your cleaning program.

Energy and Chemical Monitoring Equipment
Monitoring systems that evaluate energy and chemical usage in ware washing machines may be provided by the company that provides the ware washing machine. The data can be used to improve procedures, maximize energy efficiency and minimize chemical use. Energy and chemical monitoring equipment is available from Ecolab.

Web-Based Monitoring Software

Online software platforms allow schools to track their purchases, monitor cleaning procedures and evaluate waste. These tools enable schools to share information with stakeholders and

monitor progress. For example, the Sustainability Dashboard evaluates green cleaning products and procedures against costs.

Emerging Technologies

In the constantly changing green cleaning marketplace, new technologies are always emerging. Some of the latest technologies may sound promising, but we are still waiting to see the long-term impacts, including benefits and costs. In some cases, these emerging technologies could greatly benefit schools and **the environment. In other cases, we'd like to see** additional research before we recommend them for a green cleaning program.

Bacterial Resistant Surfaces

Antimicrobial silver additives incorporated into surfaces on high touch points, such as drinking fountains, tables and counter surfaces, can inhibit bacteria, fungus and mildew. The surfaces still need to be cleaned regularly. The company Oasis offers drinking fountains with this feature.

Silver-ion Technology Disinfectants

Silver-ion disinfectants are chemical-free cleaning agents with 24-hour residual protection. However, because this technology relies on nanoparticles of silver, its long-term effects on human health and the environment are unknown. Silver-ion technology disinfectants are available through PureGreen24.

Thymol

Thymol is a disinfectant extracted from the oils in thyme. Although it has the environmental benefit of being plant-based, it is relatively expensive and comes in ready-to-use (RTU) form, which requires more packaging. Furthermore, it has not faced years of scientific testing. Initial EPA analysis found thymol to be surprisingly toxic, both acutely and chronically. Additional research is needed before a recommendation could be made.