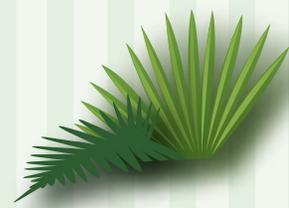


# *Creating a Green and Profitable Work Environment*



An informative guide to "green" cleaning and maintenance practices which provide efficient, productive and healthy operation of commercial buildings in Florida.

2003



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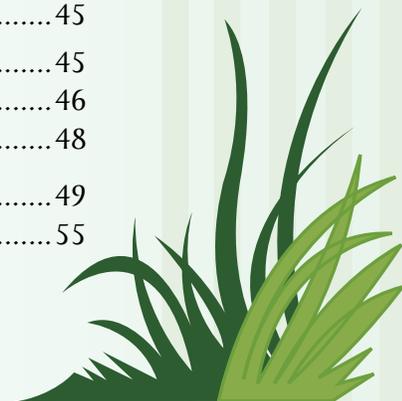
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# Appendix A: Opportunities to Consider When Undertaking a Renovation Project

The primary scope of the “Creating a Green and Profitable Work Environment” guide is to focus on procedural modifications to cleaning and maintenance activities, which may involve minor capitol expenditures. However, as most commercial buildings undergo some sort of renovation during their lifetime, this appendix is included to highlight potential opportunities that a building manager may suggest to the renovation design team. Incorporation of these recommendations will inevitably require more detailed research, design, and analysis than presented here, but if successfully incorporated, can further enhance the indoor environmental quality, energy efficiency, and water efficiency of the building, while reducing the amount of waste generated during building operation, cleaning, and maintenance. For more detailed recommendations, building managers are encouraged to consult the various green building standards and reference documentation available from the Florida Green Building Coalition ([www.floridagreenbuilding.org](http://www.floridagreenbuilding.org)) and the US Green Building Council’s LEED™ rating system ([www.usgbc.org/LEED/LEED\\_main.asp](http://www.usgbc.org/LEED/LEED_main.asp)).

## Indoor Air Quality

Design professionals consistently incorporate features and strategies into building renovation projects that practically and efficiently enhance the comfort and productivity of the occupants, but often overlook similar needs of cleaning and maintenance staff. Recommendations in this section focus on renovation projects involving restrooms and tenant areas. Most of the recommendations in this section have been

detailed by Stephen Ashkin of the Ashkin Group in his paper “Green & Clean: The Designer’s Impact on Housekeeping and Maintenance”, published by the American Institute of Architects.

## Restrooms

As previously mentioned in this guide, restrooms consume an enormous amount of time of cleaning personnel to maintain adequate aesthetics and health. Incorporating simple design strategies into a restroom renovation can significantly reduce the amount of time required of cleaning staff to maintain the restroom, effectively reducing an overall cleaning budget as well as enhancing indoor environmental quality.

- Flooring Materials – Hard surface, non-porous materials such as ceramic tile and terrazzo are an excellent choice to minimize harborage of bacteria and maximize ease of cleaning. If tiles are used, larger sizes should be selected to minimize grout, and the grout lines themselves should be as small as practical. Darker colored grouts are easier to maintain than lighter colors.
- Floor Drains – Drains should be installed in restroom floors to allow them to be flood mopped easily.
- Counters & Sinks – Counters should be designed to incorporate a recessed sink, or include a sink molded into the counter as a single unit for ease of cleaning. Sinks should be free of difficult to clean ribs and ridges, and deep to minimize splashing. The counter should be slightly



Sherri Shields, FSEC

Figure 23. Stalls and partitions should be suspended from the ceiling or extend from a wall to permit easy floor mopping and reduce build-up of soil on legs and other floor supports.

graded to eliminate standing water, and a front lip should be included to prevent water from leaking onto the floor. Hot and cold water taps should be installed underneath the counter to facilitate filling of a mop bucket, or connection of a hose.

Recommended counter materials include, cultured marble, ceramic tile, Dupont Corian<sup>®</sup>, and other

hard surface, non-porous materials. Marbleized and textured surfaces have been found to hide water spots and soils better than solid colors. Many solid surface countertop materials are often free of formaldehyde containing glues and binders, that offgas over time. This presents an additional health benefit to the facility.

- Mirrors – To minimize the water spots on mirrors, and the resulting need for cleaning, mirrors should be installed above a large splash plate.
- Toilets & Urinals – Visible piping and plumbing should be minimized to reduce the amount of surfaces that require cleaning. If possible, toilets and urinals should be suspended from the wall they are up against to permit easy cleaning underneath and around them. Further recommendations regarding reduction of water consumed by toilets and urinals is given in the water efficiency section of this appendix.

- Stalls & Partitions – As with other materials used in bathroom construction, stalls and partitions should also be of non-porous, solid materials. Painted materials and wood laminates eventually become damaged and can harbor bacteria. Where possible, urinal partitions should be avoided to reduce the amount of surfaces that need regular cleaning, and all stalls and partitions should be suspended from the ceiling or extend from a wall. This will permit easy floor mopping and reduce build up of soil on legs and other floor supports.

#### *Tenant Areas*

Along with restroom upkeep, tasks such as dusting, vacuuming, and spot cleaning consume a large portion of cleaning staff's time, and therefore also contribute significantly to the cleaning budget for a commercial building. When redesigning or renovating tenant space, consider the following suggestions.

- Electrical Outlets – An abundance of electrical outlets throughout the building can reduce the amount of time that cleaning and maintenance staff spend dealing with extension cords as they maintain the building with vacuums, floor buffers, etc. This is particularly important in high traffic areas where such activities are conducted quite regularly.
- Finishes – Often overlooked when selecting interior finishes is their ability to resist soiling and ease of maintenance. Minimizing the number of materials with differing cleaning requirements (glass, metals, tile, wood, etc.) can significantly increase cleaning productivity and reduce the amount of cleaning products used. Soft materials, including softer metals such as brass and chrome, and softer

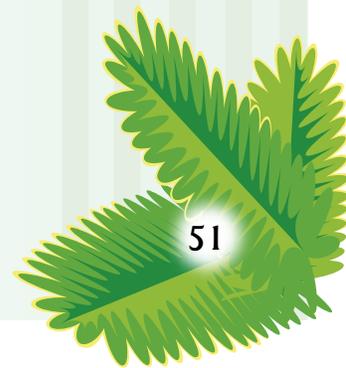
woods such as pine and fir have been identified as materials to avoid if possible, due to their tendency to become easily damaged by cleaning staff as well as other occupants.

- Interior Design Features – Minimizing the amount of horizontal surfaces present that have the ability to collect dust can increase the productivity of cleaning staff by allowing otherwise collected dust to fall to the floor where it can be removed easily by vacuuming or mopping. Interior design features to avoid where possible include shelves, moldings, and trims.
- Flooring – There are many issues to consider when selecting a finished flooring material, including ease of cleaning, durability, potential to contribute gaseous pollutants to the workplace, and impact of disposal. Non-porous, hard surface flooring can often perform better than carpet from a cleaning standpoint, due to some carpet's potential for harboring dust mites and other allergens. Hard surface flooring also tends to be more durable in response to both traffic, and staining/soiling. When selecting a hard surface flooring, it is important to ensure the flooring is not constructed or installed with materials that will emit large quantities of VOCs. Such materials include binders, backers, adhesives, and protective top coats. Flooring constructed from a sustainable source of material such as bamboo, cork, or certified sustainable lumber also helps maximize natural resources.

When selecting carpet, there are a myriad of issues to consider, and a myriad of types and styles to choose from that address some or all of the issues. The organization Green Seal has produced

a “Choose Green” report on carpet, that provides an excellent overview of the issues, as well as details on how specific carpet products respond to those issues. The report can be found at: [www.green seal.org/cgrs/Carpet\\_CGR.pdf](http://www.green seal.org/cgrs/Carpet_CGR.pdf), and summarized here are items from its “checklist” when shopping for green carpet:

- Buy refurbished carpet wherever possible.
- Specify carpet with high overall recycled content (in the face fiber and backing), preferably postconsumer. EPA's Comprehensive Procurement Guidelines (CPG) designate a 25–100 % total recovered materials content (all post-consumer) for polyester carpet face fiber. The guidelines for nylon carpet are currently available only in draft form, but they recommend that the face fiber should have a total recovered materials content of 25–100% (1–100% of it post-consumer) and that the backing should be made of 100% recovered materials (with a post-consumer content of 35–70%).
- Ask whether environmental leasing or take-back programs are provided, to ensure that the carpet will be replaced only as necessary and reused or recycled by the producer.
- Use carpet tiles where appropriate to extend the life of the installed floorcovering. The use of carpet tiles allows for selective replacing of damaged or worn areas.
- Buy carpet made from recyclable materials and likely to be easily accepted for recycling under existing programs. Carpet containing nylon 6 face fiber and vinyl-backed carpets



are currently recyclable. No recycling programs currently exist for polyester carpet.

- Consider purchasing carpet made of wool or other natural fibers if your primary concern is the use of non-renewable resources.
- Buy carpet that is solution-dyed.
- Buy carpet that meets CRI Indoor Air Quality standards (Green Label program).
- Ensure that low VOC adhesives (CRI certified) are used during installation.
- Buy a carpet product that is consistent with the desired performance level, expected use pattern, and replacement schedule.
- Select an appropriate color for the carpet application. Light colors tend to get soiled easily and may require the frequent use of harsh cleaning chemicals and/or replacement.

## Energy

There are many options available to improve the energy efficiency of a commercial building or facility. Many of these options do not require a renovation project to implement, but can often be financed/budgeted in conjunction with an upcoming renovation project. More detailed information regarding the opportunities presented in this section, along with design guidance can be found at the website for the Florida Solar Energy Center: [www.fsec.ucf.edu](http://www.fsec.ucf.edu).

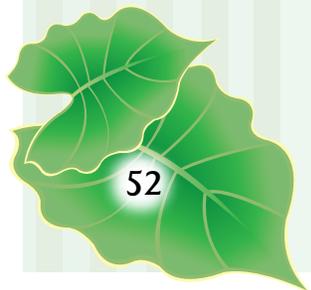
### *Solar Water Heating*

Solar water heating systems can reduce water heating costs from anywhere between 50%-100% in commercial buildings over electric resistance and gas water heaters. This is an ideal retrofit option for small to medium office and other commercial buildings since

the demand for hot water is often very small (primarily hand washing and lunch room uses) and the demand is almost exclusively during daylight hours. Extent of savings depends on a number of factors including system size, hot water demand, etc. and often a conventional electric resistance or gas backup is also installed for times of high demand. In buildings where the need for hot water is not seen as critical (such as restroom hand washing only), reliability of solar systems has proven to be sufficient to supply adequate hot water without a backup system. The large degree of savings available from the installation of a solar hot water system will often offset any additional monthly loan cost when included with a renovation project, and the savings will continue to accrue eventually creating a positive cash flow and provide a hedge against rising electric and gas rates. Information regarding manufacturers, vendors, and installers of solar hot water systems in Florida can be found through the Florida Solar Energy Industries Association at [www.flaseia.org](http://www.flaseia.org). Design primers and equipment descriptions can be accessed on the Florida Solar Energy Center website at: <http://www.fsec.ucf.edu/Solar/index.htm>.

### *Solar Exterior Lighting*

The use of solar energy for exterior lighting is another excellent opportunity for commercial buildings in Florida, offering up to 100% reduction in energy used for exterior lighting. Applications are many including parking lots, entrances, walkways, and security lighting. In most installations, a small solar photovoltaic panel is installed for each light fixture, which charges a battery during daylight hours. Sensors or timers activate the light at nightfall which operates off of the battery power. Critical applications such as security lighting may be installed with an electric backup. All solar lighting uses the most efficient bulbs and fixtures available, and many conform with the



suggestions mentioned earlier in this guide dealing with minimization of light trespass. The website of the Florida Solar Energy Center contains documents dealing with solar exterior lighting fundamentals, technical specifications, and equipment vendors and can be accessed at: <http://www.fsec.ucf.edu/PVT/RESOURCES/publications/pubs3.htm>

### *Roofing*

If a renovation project involves a roofing replacement or recovering, light colored roofs in a hot and humid environment such as Florida's have been shown to significantly reduce energy used for space cooling, in some cases in upwards of 30%. Testing conducted by the Florida Solar Energy Center has revealed that a white ceramic tile or white metal roof performs best. These types of roofs will last 30-40 years compared to the 15 years that is typical of asphalt shingle roofs. White reflective roofs can lower attic temperatures by up to 25-30 degrees F. Many commercial buildings with central AC have ducts in the attic where there is a significant amount of heat gain. The white roof lowers the attic temperature greatly increasing the air distribution efficiency of the HVAC system. The lower attic temperatures can also reduce heat gain encountered by uncontrolled airflow leaking into the conditioned space through a leaky ceiling plane, as previously mentioned in this guide. Along with white metal and ceramic tile, various white coatings and light colored asphalts have shown some lesser improvement over darker colors. More information on "cool roofs" can be found at: <http://www.fsec.ucf.edu/bldg/commercial/nonres/walls-roofs/index.htm>.

### *Windows and Window Shading*

A significant amount of solar heat gain is placed on a commercial building's HVAC system as it enters through the building's



Figure 24. A variety of solar exterior lights undergoing testing at the Florida Solar Energy Center.

windows. If it can be accommodated by a renovation project, installing spectrally selective windows or architectural features to shade existing windows can offer significant cooling energy savings, depending on a number of factors such as the amount of glazing, and the direction it faces. Retrofitting improved windows, shades, or other attributes can represent a costly investment. However, replacing old conventional windows with well-chosen energy-efficient ones can result in significant yearly energy savings, better comfort, and improved occupant satisfaction. This can also increase productivity in commercial or office buildings, which often saves more dollars than the entire energy bill itself. Detailed information on window selection and shading strategies can be found at: <http://www.fsec.ucf.edu/bldg/active/fen/>.

### **Water**

Many common strategies that will reduce water consumption in a commercial building such as water fixture retrofit and exterior landscaping / irrigation considerations are discussed in section 6.0 Identify Opportunities III – Cleaning and Maintenance and Building Water Use of this guide. Such strategies can often be undertaken independent of a renovation project, and any capitol outlay is often well rewarded

through large savings in water and/or sewer charges. In this appendix, waterless urinals are discussed as an opportunity for further savings. Various case studies involving the use of such units have found a need to lower the position of the urinal drain line, making the installation of such a unit more of a renovation project than a simple fixture retrofit.

#### *Waterless Urinals*

Waterless urinals have been on the market since 1992, and today there are three companies that offer similar units. All three designs operate by utilizing a lightweight fluid (lighter than urine) that allows urine to flow down through the trap, but keeps gaseous odors from entering the restroom from the sewer. Prices of waterless urinals vary from about the same as conventional urinals, to about twice as much as conventional urinals, but due to zero water use during flushing, savings can be achieved almost immediately.

Manufacturers of waterless urinals state that hygiene is enhanced through use of a waterless unit, due to the fact that bacteria require a moist environment in order to live. The primary source of bacteria in restrooms is that which becomes airborne as toilets are flushed, and settles on close by surfaces. Since waterless urinals are designed to dry out between uses, they do not provide as hospitable of an environment as do conventional urinals and sinks.

Waterless urinals do require periodic maintenance involving a regular cleaning, as well as periodic replenishment of the lightweight fluid (monthly, depending on use) for a nominal fee. A small amount of this fluid is lost with each flush, but has not been determined to pose any environmental impact on wastewater treatment operations. Two of the available units require a trap replacement a few times a year (ranging from \$6 - \$35

per trap) due to sediment build up overtime. The third and most expensive unit does not require trap replacement, but instead a thorough monthly flushing.

Although waterless urinals have their own maintenance considerations, many case studies have found them to be less intensive than maintenance typically carried out on conventional urinals such as valve replacement and dealing with clogged and overflowing units. Waterless urinals have been operating with favorable results in various federal government, local government, school, military, university, and sports arena sectors.

For more information on waterless urinals, contact the manufacturers or read reviews in Environmental Business News.

Waterless Company – [www.waterless.com](http://www.waterless.com)  
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