LICENSED ARCHITECT

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Summer 2023

From Mies to McDonald's

Solar for Architects Pt 1

Commercial Restroom Design

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Cover Photo:
Copper Mountain Residence (PLAAD Architecture)
Photo by: VONDELINDE

PRESIDENT'S message

For a quick roundup of our summer highlights, please see the article "From Mies to McDonald's." You will enjoy reading about ALA's two outstanding educational tours and view some memorable photos. In June we visited the Edith Farnsworth House, a Mies van der Rohe modernist masterpiece and in July we toured Chicago's Fulton Market District.

Judging of our annual Design Awards starts September 15 and this year we will celebrate the awards on October 20 at the historic Medinah Country Club, Medinah, IL. Medinah Country Club's 1926 clubhouse is one of the most popular buildings designed by Chicago architect Richard Gustav Schmid, who was known for using Byzantine and Oriental features in his buildings. It is certainly a gem for ALA's premier event of the year. We hope you will join us.

Please plan to attend the second ALA Architecture Conference for 2023 on November 16 in person or online. You can earn up to six continuing education credits for attending the conference, which has the theme, "Change is the New Norm." Registration opens in September and tabletops are available for suppliers now. Our keynote speaker is Rusty Smith, Associate Director, Rural Studio. The Studio has been in operation for 30 years and is an off-campus design-build program of Auburn University's Architecture Program. Rural Studio gives architecture students a more hands-on educational experience while assisting an under-served population in West Alabama's Black Belt region. We are looking forward to this exciting presentation and the line-up of other great speakers, which will be announced soon.

We encourage you to log in and explore the many ALA member options, including the free online continuing education available to members. Visit ALA's on demand learning center at www.alatoday.org/odlc Check out upcoming programs under Events on the ALA home page alatoday.org

Please reach out with ideas, comments, and suggestions – just email ala@alatoday.org.

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From Mies to McDonald's:

Memorable ALA Tours in 2023

BY: TONI ANTONETTI, PR CHICAGO

Recent ALA tours of the iconic Edith Farnsworth House in Plano, IL and Chicago's historic Fulton Market attracted considerable attention and interest this year.

PHOTO COURTESY OF EDITH FARNSWORTH HOUSE

The Edith Farnsworth House, designed by Mies van der Rohe, helped to define modernist architecture and the noted architect's unique perspective on the importance, as he says, of bringing "nature, houses and the human being to a higher unity."

Painstaking restoration of the home's extended exterior will help to preserve its travertine pavers and protect them from the periodic threats of flooding from the Fox River.

The Edith Farnworth House, situated on 60 acres on the Fox River, famously illustrates Mies van der Rohe's less-is-more minimalism. The modernist masterpiece was designed and built from 1945-1951 as a weekend getaway for Dr. Edith Farnsworth. In keeping with the international style, The Edith Farnsworth House celebrates volume over mass, with glass walls creating a light and airy quality and allowing the surrounding rural landscape to become part of the experience. The home breaks old rules, eschewing symmetry in favor of visual balance and maintains a strong horizontal design element, in part, by keeping visual noise to a minimum, with underground wiring, no gutters or downspouts and no stair railings. The five-foot elevation creates a classic rule of thirds perspective, as well.

Fulton Central Market, 936 W. Fulton Market, was built in 1923 for poultry and egg businesses.

Tour guests learned about the home's history of flooding from the Fox River, first in 1996-7 and again in 2008, which required extensive restoration of the home and the expansive deck. Most recently, restoration work is being completed with the help of engineering and architectural firm Wiss, Janney, Elstner Associates, masonry contractor W R Weis, and Zera Construction on the cantilevered deck extensions, which required removing, salvaging and replacing the

Intricate brickwork: Brick color and texture help to determine the building's age, according to Brick of Chicago's Will Quam.

1000 Fulton Market, originally a cold storage facility built in 1923, is now a LEED Gold-certified office and retail building.

original travertine pavers and adding a waterproof coating system with a precast concrete overlay.

Designated a National Historic Landmark in 2006 and now owned and operated as a museum by the National Trust for Historic Preservation, the Edith Farnsworth House shows how thoughtful design gives humans the freedom to create and thrive within a flexible, unobstructed space and to connect with the natural environment.

Will Quam of Brick of Chicago and Joe Lombard of PCI of Illinois and Wisconsin conducted a walking tour of Chicago's landmark Fulton Market.

Participants learned about brick buildings originally constructed for the area's meat packing industry as early as 1887, the history of brick as a design material and how texture, color and design can pinpoint a building's age.

The tour included newer precast concrete office buildings skillfully designed to fit into the historic neighborhood, such as McDonald's global headquarters with precast herringbone ornamentation; Google, at 320 Morgan, 1000 W. Fulton, a renovation of a 1923 cold storage facility and 320 Sangamon, a modern take on the traditional loft.

In 2018, McDonalds moved its suburban Chicago headquarters to a nine-story facility at 110 N. Carpenter Street. It features decorative herringbone ornamentation that helps it to gently blend into the historic surroundings.

plaad

PLAAD is a Minnesota-based architecture and design firm with a passion for client-centered professional design services. We founded PLAAD in 2014 with one primary focus: to better our clients' lives through enduring design. We are architects and designers, and we think we are pretty good at what we do. But first and foremost, we are people. We are husbands, wives, fathers, mothers, and friends who understand how an intimately crafted space can augment a life well-lived.

Our team is award-winning, our work is national and varied, and our commitment and dedication to our clients is remarkable.

Credits: Photos by VONDELINDE

Copper Mountain Residence, Copper Mountain, CO

This on-mountain home in Copper Mountain, Colorado offers ski-in and ski-out capabilities and works to define a nuanced balance between modern and traditional while challenging the locally accepted conventions of "mountain modern."

Credits: Photos by VONDELINDE

Sunfish Lake Contemporary, Sunfish Lake, MN

This home is thoughtfully positioned to engage the boundary condition between prairie and woods. With the immediacy of the surrounding environs and the effervescent interplay of light and shadow, a rooted, dynamic, and very personal living space was developed.

Credits: Photos By VONDELINDE

Lakefront Residence Mahtomedi, MN

Engaging the lakefront site in a respectful way, this modern residence presents a quiet and restrained one-level street front, opening up to a walkout with sweeping views of and access to the lake at the backside.

Credits: Photos By Carrie Patterson Photography

Jackson Hole Residence, Jackson, WY

With unobstructed views north towards the Tetons, the project consists of two gable volumes linked together in the middle by a glass-enclosed living link. While referencing the formal vernacular of a traditional farmhouse, the details are quite modern, restrained, and minimal. (Featured in May/June 2019 25th Anniversary issue of Mountain Living: "Farmhouse with a Twist.")

Credits: Photos By VONDELINDE

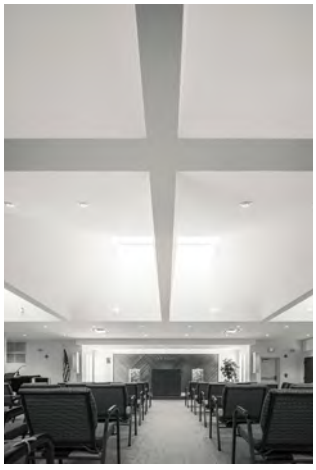
Nordic Traditional, Sunfish Lake, MN

Charged with maximizing the lake views and paying homage to our client's Nordic heritage, we developed a thoughtfully composed home in the traditional Norwegian vernacular, implementing motifs found in Scandinavian architecture through detailed timber columns, bracketry and stairs.

studio talo

Studio Talo Architecture specializes in being generalists. Thomas Ahleman founded the firm in 2004 with the belief that good design means creating enduring relationships among spaces, materials, people and the planet. The firm collaborates with a wide range of clients from homeowners to businesses and non-profit organizations who share the firm's commitment to their community.

The firm helps clients define their needs and priorities, creates sustainable solutions that achieve those goals, and provides vision and leadership throughout the design and construction process.

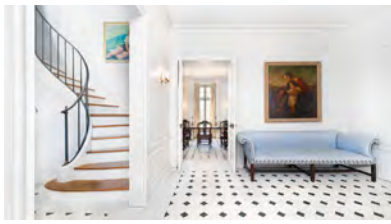


Church Addition, Barrington, IL

The First Church of Christ Scientist congregation in Barrington, IL needed a more accessible worship space, a new Sunday school, and a new home for its Reading Room which is open to the public.

Youth Services New Construction, Evanston, IL

Y.O.U. stand for "Youth and Opportunity United". This new 12,500 square foot building unites the organizations offices on the second floor with program spaces for youth on the first floor including a gathering space, commercial kitchen for culinary therapy, counseling offices and a maker space.

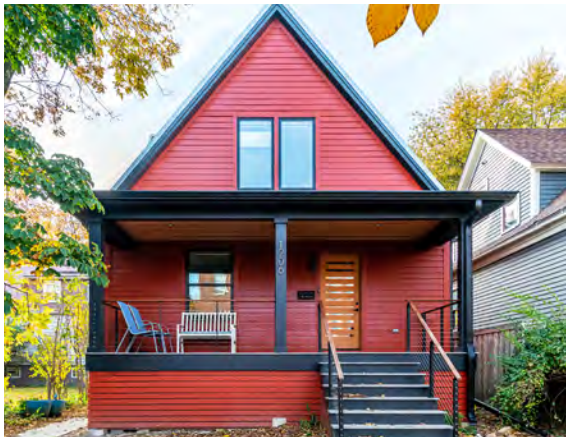


Residential Addition, Lake Forest, IL

Construction of this Lake Forest home was cut short by the onset of the Depression almost a hundred years ago. This addition completes the original forecourt design and helped the owners secure a tax freeze through the State Historic Preservation Office's program. Studio Talo served as construction manager for the project.

Accesory Dwelling Unit, Evanston, IL

Progressive zoning laws in Evanston made the construction of this three-bedroom apartment over an existing brick garage possible. South-facing clerestory windows flood the common living areas with natural light.



Residential Renovation and Addition, Evanston, IL

The owners, a painter and a Northwestern University geologist, wanted energy efficiency, bold colors, and modern details for this addition and renovation that would allow them to continue living in the home where they raised their kids.

Solar: A Building Electrification Trend That's Here to Stay

BY: DAVE WILMS, SUNPEAK

Making Rooftop Solar Part of Your Next Client Discussion

While climate change and energy prices continue to dominate daily news feeds and corporate strategies, recent pro-solar federal legislation and manufacturing efficiencies have paved the way for cost-effective and attractive solar energy systems for both commercial and residential applications. As critical members of building design and renovation projects, architects can help inform customers on the myriad of ways they can incorporate solar into their buildings and homes.

Figure 1. Solar energy systems are attractive options for both commercial and residential applications

This two-part series aims to provide architects with relevant and up-to-date information on solar energy technology and how to plan for the design and implementation of these systems. Below, we'll examine the current state of solar growth, the components of a solar installation, and initial engineering considerations for new and existing buildings. In the next issue, we'll take a deeper dive into solar design and construction topics including solar mounting options and equipment choices.

Why Solar Now?

Solar is a mature technology with the ability to reduce one's electricity costs and environmental impact for decades. Solar energy made up 47 percent of all new electricity generation in the US from 2010-2021 according to the International Energy Association (IEA), surpassing any other single means. Thanks to global subsidization of the technology, the price of solar in the United States has rapidly dropped nearly 90 percent. Consider that the cost to produce an unsubsidized kilowatt hour (kWh) of solar has dropped from roughly $.36 in 2009 to just $.03 in a little over a decade (Lizard 2020). By comparison, both coal and nuclear-based power still average 10-14 cents/kWh. Battery systems to support solar have already come down in price and will further continue to encourage solar adoption as they become more cost effective.

Architects can help inform customers.

Figure 2. Solar is a mature technology with the ability to reduce electricity costs and environmental impact

Customer Benefits

From a customer perspective, the current benefits of solar are immense. With recent passage of the Inflation Reduction Act, landmark legislation earmarking nearly $400 billion in federal funding to clean energy, building and homeowners can use a tax credit to reduce their solar investment cost immediately by at least 30 percent. Moreover, many states and local agencies provide additional financial incentives that further improve return on investment. In addition to reducing their utility costs significantly with solar, businesses and corporate customers also gain a unique chance to visibly communicate their shared values with clients, employees, and others in the supply chain, a move that can provide and promote loyalty and a competitive advantage.

Renewable Energy is the Future

Solar technology has advanced to a point where it has become a dominant contributor to our country's grid mix, and that trajectory is only expected to rise. A solar panel produced today efficiently converts light into usable energy, and has a long, useful lifespan that can exceed thirty years. Most solar panels manufactured today are guaranteed to produce 80-90 percent of their initial power rating for 25 years and only degrade at about 0.5 percent/year, on a linear basis. Additionally, all new solar installations now require rapid shutdown, so a system can quickly be turned off with no electricity flowing through the system. This safety feature was mandated via the National Electric Code in 2014 and removes the risk of electrocution from touching electric conductors during an emergency or needed maintenance.

Figure 3. Solar technology has advanced to a point where it has become a dominant contributor

By being an efficient, safe, low-cost energy source that reduces fossil fuel use and carbon emissions, solar energy satisfies several critical targets with one solution. Solar technology is so economical today that to design a building without some solar production included is a missed opportunity for customer financial and environmental savings.

Federal and Other Financial Incentives

Several financial incentives are readily available for solar. As mentioned earlier, the Inflation Reduction Act provides companies, non-profit organizations, and homeowners that opt for solar with a significant federal tax credit, called the Investment Tax Credit. Secondly, system owners can claim their solar asset for federal accelerated depreciation treatment. Thirdly, many state grants, Solar Renewable Energy Credit (SRECs) programs, utility-sponsored grants, and other local rebates can all further improve payback where available. The Database for State Incentives (DSIRE) (**https://www.dsireusa.org**) can be a helpful resource to find out what incentives exist for your customer projects.

Utility Policies

Utilities across the country all have different policies relating to solar. Net metering, for example, is a utility policy that can play a large role in solar system sizing. When a favorable net metering policy is in place by a utility, a customer that sends surplus solar power to the grid can be credited or compensated for the electricity. Conversely, some utilities actually impose a penalty on any grid-interactive solar system, which can erode payback. In these cases, the size of the solar system can be designed to maximize savings onsite while minimizing

export back to the grid. These policies are often posted on a utility's website or can be found on the DSIRE site and are worth an early look when considering solar.

Growing Global Corporate ESG Priorities

ESG (Environment, Social, and Governance) tracking and reporting is a growing focus amongst corporations worldwide. ESG is an initiative that provides greater transparency to the public and potential investors about a corporation's conduct as it relates to the environment and societal impact. While ESG reporting is currently voluntary in the United States, the US Security Exchange Commission (SEC) has launched the Climate and ESG Task Force to monitor company misconduct more closely in these areas.

Starting in 2024, the EU will require any business making over $20 million per year to track and report their global carbon imprint (including their supply chain partners in the US) and provide plans to reduce its carbon footprint over time. This environmental disclosure, monitoring, and verification process will inevitably have a huge impact on future business investments at home and abroad and will ultimately encourage companies to make larger investments in renewable energy over time.

General Components of a Solar Installation

Most commercial solar systems are "grid interactive" and work in conjunction with a facility's utility service. Grid interactive solar PV systems do not replace, or in any way disrupt, the facility's existing utility service.

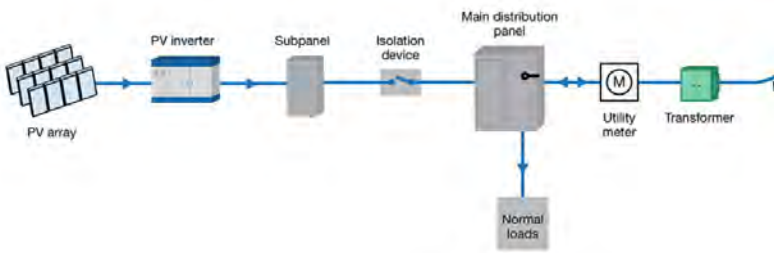


Figure 4. Structure of a modern grid interactive solar PV system

Figure 4 shows the basic building blocks of a modern grid interactive solar PV system. Most systems today do not involve battery storage, but that can be incorporated for additional power demand management and load shifting functionality. As the diagram indicates, no changes are made to the utility service which assures 100 percent availability of utility power, regardless of time of day or weather conditions.

The solar PV system is typically interconnected "behind-the-meter" as a supply circuit into the main distribution panel of the facility. This arrangement assures that all power generated by the solar PV system is consumed by the facility first. If surplus power is being generated by the system (solar production > facility load), the surplus power will export to the grid. A bidirectional utility meter is typically incorporated into the design, which allows credit to be offered by the utility to the customer for surplus power if a favorable net metering policy exists.

For most commercial customers, the solar PV system will only provide a portion of the facility's power. In this case, all the electricity from the solar PV system is consumed by the facility, and the remaining power is drawn from the grid in the traditional fashion. With solar, overall energy consumption from the grid is lower than it would have been had the solar system not been contributing. This leads to a net reduction in the electrical costs to the facility, which leads to a positive return on investment.

Making Provisions for Solar PV

For companies or homeowners interested in adding a solar PV system to their building or home either immediately or in the future, early planning and a few proactive steps can make the project less disruptive and more cost effective.

Figure 5. Working with a reputable solar provider is important

Working with a reputable solar provider that specializes in all aspects of solar, including the engineering, procurement, commissioning, and ongoing maintenance of the system, is an ideal scenario that will help you and your customers efficiently and cost-effectively arrive at accurate system layouts, costs, and equipment choices. SunPeak, a leading solar EPC (Engineering Procurement and Construction) provider that performs work nationally, provides the following general guidelines.

Structural Considerations

While every building and solar project is unique, the following are general guidance measures that hold true for most scenarios:

- Allow for an additional 4-8 pounds per square foot (PSF) of roof load for the future PV system, with localized loads of up to 15 PSF. Ballasting requirements generally increase in geographical areas with high wind, so additional attention is needed in these areas.

- Designate material staging areas on the roof where allowable loads indicated for PV system construction exist.

Mechanical Considerations

In the case of new construction, consider the placement of mechanical equipment, vents, conduits and other roof obstacles. By grouping rooftop units, plumbing vents, fans, etc., close together, it frees more contiguous roof space elsewhere for solar. If possible, plan for HVAC equipment on the northern portions of the roof which helps avoid loss of electricity production due to shading.

Roofing Considerations

Because solar PV systems can provide value for upwards of 30 years, an existing roof needs to be in good shape with most of its useful life still ahead of it if solar will be installed. Although all roofing types can work with solar, fully adhered roofing systems such as TPO or EPDM membrane, are the most efficient for a PV array. They have advantages over ballasted and standing metal seam roofing systems in terms of installation, serviceability, and sometimes solar production. Whenever possible, a solar installer should work closely with the roofing contractor to ensure the roof warranty is maintained and the roof integrity is unaffected by the addition of solar. At times, additional roofing material, such as a slip-sheet, will be placed under the solar racking to prevent possible wear to the roof surface.

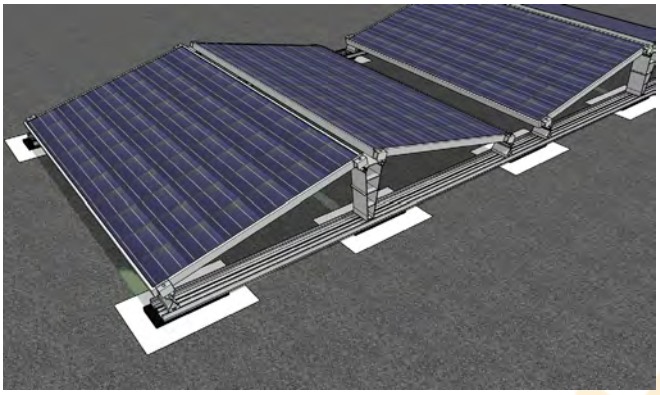


Figure 6. Slip sheets provide an additional layer of roof surface protection for an adhered roof

Solar energy made up 47 percent of all new electricity generation in the US from 2010-2021!

Electrical Considerations

When designing or retrofitting a building that will have rooftop solar, provisions need to be made based on the type of interconnection scheme used. For a load-side interconnection, breaker space at the end of the service panel/switchboard needs to be available. Oversizing the bus of the service panel will increase the allowable size for a load-side interconnection.

For a line-side interconnection scheme, a dual lug Current Transformer (CT) cabinet or main section of the electrical panel is recommended. Also, allow space in the facility's electrical room for an additional main switchboard section, the distribution panel, and any additional wall-mounted equipment that may be useful, such as solar monitoring equipment.

The maximum system size that the roof space will allow can be roughly estimated using 7 - 10 W/ft^2 AC. This estimate can be used to estimate the electrical production based on setbacks, obstacles, and shade allowances.

System Layout

To get a very basic sense of what size solar installation a roof could hold, the National Renewable Energy Labs' PV Watts site is a useful resource (**https://pvwatts.nrel.gov**). There are tools on the site that can give you an estimate of a specific building or you can use an expected roof size to get an estimate. PV Watts will also calculate the approximate kWh produced per year and the electricity savings for that specific location. It is useful for a quick estimate, though a commercial solar developer will be able to provide a much more comprehensive assessment for a customer based on specific site characteristics, roof conditions, and the use of more advanced energy modeling tools using the customer's historical energy consumption data.

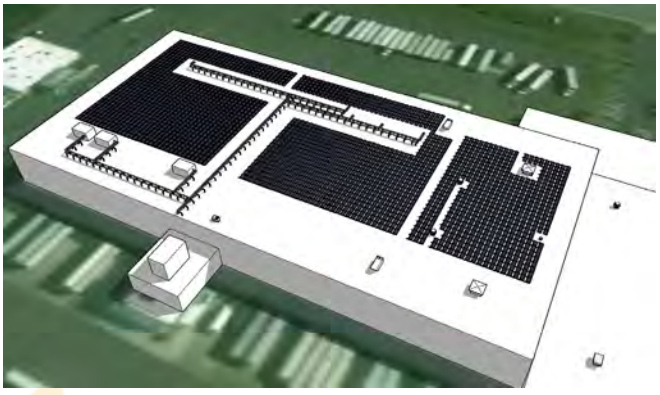


Figure 7. A commercial solar developer can provide a comprehensive assessment

Key Takeaways

We are embarking on the new renewable energy future, with solar leading the way as an effective means to save money and mitigate the dangerous climate trends we are seeing today. With proper planning and coordination, a solar PV system can offer reliable, safe, clean and inexpensive electricity for facilities and homes for decades to come.

Figure 8. Renewable energy is the future, with solar leading the way

Please watch for part two of this series, exploring solar procurement and construction, in the next issue.

References

US Energy Information Administration, Annual Energy Outlook 2020 (AEO2020) Reference case.

EU's New ESG Reporting Rules Will Apply to Many US Issuers, Harvard Law School Forum on Corporate Governance, *Posted by Emma Bichet, Jack Eastwood, and Michael Mencher, Cooley LLP, on Wednesday, November 23, 2022.*

Images: Courtesy of SunPeak

About the author: *Dave Wilms (d.wilms@SunPeakPower.com) is a retired Adlai Stevenson High School AP Environmental Science teacher in Illinois who now uses his interest in solving environmental problems by developing solar energy projects to help reduce climate change and pollution issues associated with fossil fuels. He works with SunPeak, which is a leading, full-service solar photovoltaic developer specializing in commercial and industrial applications.*

For more information, please visit www.sunpeakpower.com.

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Three Keys to Commercial Restroom Design:
Safety, Sustainability, and Savings

BY KATHY PRICE-ROBINSON, (SPONSORED BY EXCEL DRYER)

Perception of building quality can hinge on the restroom. When comparing the square footage of commercial restrooms to the total square footage of a building, the impact of the space far exceeds its relative size. What words come to mind regarding the last commercial restroom visited? Was it dirty or clean? Cramped or comfortable? Outdated or modern? Wasteful or sustainable? Dangerous or safe? Much depends on the features and amenities provided as well as the level of maintenance. The Covid-19 pandemic thrust the safety of restrooms into sharper focus. This article helps architects consider what it takes to create sustainable and safe restrooms, with a focus on hand-washing, without breaking the bank.

Figure 1. An integrated system with a touchless faucet and hand dryer in one assembly produces no paper waste and minimizes movement around the restroom in a post-pandemic world

THE SIGNIFICANCE OF COMMERCIAL RESTROOMS

Restrooms cannot be an afterthought when designing commercial buildings. While they typically only take up 5 percent of a building's total square footage, they have outsized importance. For instance, according to the American Institute of Cleaning Sciences, they account for:

- 40% of the building's whole soil level.
- 50% of occupant complaints.
- 20% of the total labor budget.[1]

The overall mindset around hygiene is changing – making clean public restrooms more important than ever before. Survey experts MetrixLab conducted a survey in the United States over one week in August 2022.[1] The sample included

> **"There's no trash around the bathroom anymore."**
>
> **- Andy Yee, Principal Managing Partner, Bean Restaurant Group**

1,000 respondents, with a mix of adult men and women who had used a public restroom over the past six months.

The survey resulted in several interesting takeaways regarding consumer habits, personal hygiene, and public restroom preferences.

First, nearly 75 percent of consumers wash their hands three to 10 times a day.

- 21% wash hands three to four times a day
- 30% wash hands five to six times per day
- 23% wash hands seven to 10 times a day

Second, the majority of consumers have used a public restroom in the past month.

Third, restaurants are by far the most popular location for using public restrooms.

In a separate study conducted around the same time, MetrixLab gathered data from approximately 350 respondents with a sampling of key stakeholders, including:

- Architects/designers (96)
- Restaurant owners (101)
- Commercial facility managers (156)

When presented with nine restroom features implemented since the beginning of the Covid-19 pandemic, respondents selected increased cleaning protocols and touch-free technology as the biggest changes.

For designers, the focus on commercial restrooms should incorporate occupant safety, sustainability, and savings. This article helps architects consider what it takes to create quality commercial restrooms, with a particular focus on hand-washing, without breaking the bank.

Factors That Impact Commercial Restroom Design

These are the primary considerations that impact commercial restroom design and the questions that should be asked.

Occupants

- How many people will use the restrooms?
- Are there any gender-specific considerations among the anticipated users (i.e., gender-specific dormitories or locker rooms)?
- How will people use the space? Consider the broader context of the area. People use restrooms differently at an airport than at a gym or a school.
- How will accessibility considerations impact the space required, fixture size and height, and accessories (such as grab bars)? While all restrooms must be ADA compliant, restrooms in a senior living facility will likely require more amenities than those in an office building.

Budget

- What are the initial costs of the restroom? These include materials (building materials, fixtures, and supplies), installation labor, and inspection fees.
- What are the ongoing costs of the restroom? These include maintenance, supplies, and cleaning.

Design Goals

- How do you want people to feel when they enter the space?
- What are the sustainability goals for the building, including third-party certifications, such as LEED, WELL, TRUE Zero Waste, and others?

Maintenance Considerations

- How durable are the fixtures and materials used in the restroom?
- How easy are the fixtures and materials to clean?
- How many required touchpoints are in the space?
- Note: The more touchpoints there are, the more frequent cleaning and disinfection are needed.

Design of commercial restrooms impacts the functionality of the building and user perception.

Figure 2. This commercial restroom conveys cleanliness and safety with a row of touchless sink faucets and high-speed, energy-efficient hand dryers

KEY SAFETY CONSIDERATIONS WITHIN COMMERCIAL RESTROOMS

The most basic safety considerations for commercial restrooms are those set by the Occupational Safety and Health Administration (OSHA), which requires employers to provide all workers with sanitary and immediately-available toilet facilities.

The sanitation standard 1910.141 – Sanitation aims to ensure that workers do not suffer adverse health effects that can result if toilets are not clean or available when needed.

That means:

- Toilet facilities must be available at every worksite (except for mobile worksites).
- Employees must have reasonable access to a bathroom facility.
- The number of employees at the worksite determines the number of toilets.
- Each toilet must be in a separate compartment with a door.
- Hand-washing facilities must be provided and maintained in a sanitary condition.
- All restrooms are required to have running water, soap, and hand towels or air dryers.

The Impact of COVID-19 on Restroom Safety

Commercial and public restrooms impact a large portion of the population. Because of the COVID-19 pandemic, we're more aware of germs than ever. These are strategies some people take to avoid germs in restrooms:

- Operate the flusher with a foot.
- Use a seat liner.
- Hover over the toilet seat.
- Open or close doors with the body rather than the hands.

Building owners and managers have invested in significant retrofits to address pandemic safety concerns.

Reducing Touchpoints

One of the essential safety modifications in restrooms is reducing the number of critical touchpoints. Both restroom fixtures and doors can be a source of required touchpoints. According to the American Restroom Association (ARA): "Not everyone washes their hands after using the toilet. Those that do should not be required to touch potentially unclean surfaces after scrubbing their hands. Restroom doors should be designed so that after one has washed their hands, exit is possible without touching a surface."[2]

Also, each touchpoint requires frequent cleaning and disinfection, so removing touchpoints lowers overall maintenance needs. The good news is that solutions are available today to address this safety concern. The ARA notes, "Automated devices reduce the spread of disease and cost by controlling product usage." Touch-less and automated devices include:

- Door openers
- Toilet flusher
- Faucets
- Liquid soap dispensers
- Hand dryers
- Paper towel dispensers
- Toilet paper dispensers

Particularly on commodes, the ARA noted, "It is important that the sensor be installed so that it does not prematurely initiate the flush cycles. Wall sensors that detect movement away from the fixture may be less likely to falsely activate."

Hand Dryers or Paper Towels?

In every commercial restroom design, the choice arises between hand dryers or paper towels. According to the World Health Organization, both are efficient: "Once your hands are cleaned, you should dry them thoroughly using paper towels or a warm air dryer."[3] A study by the University of Arizona Health Sciences found that "the breadth of available data does not favor one handdrying method as more hygienic or safer than the other."[4,5] Instead, the specification of air dryers vs. paper towels and dispensers typically focuses on operating costs, maintenance costs, and sustainability.

Figure 3. The integration of soap, water, and a dryer in one assembly impressed Andy Yee, principal managing partner of Bean Restaurant Group

Integrated Sink Systems Pull it All Together

As perhaps the gold standard for touchless fixtures, an integrated sink system provides touchless access to the faucet, soap, and hand dryer all in one unit. In addition to reducing the required touchpoints, these systems address other safety concerns by avoiding water on the ground and reducing the circulation path. This assembly impressed Andy Yee, Principal Managing Partner of Bean Restaurant Group, which operates more than a dozen restaurants. "It's a good blend into our industry," Yee says of the integrated sink system. "It's all touchless—soap, wash, dry. You eliminate the C-fold towels. There's no trash around the bathroom anymore."

Commercial Restrooms Before and after the Pandemic

Figure 4 shows a glance at a typical before and after in a commercial restroom. Notice the differences between these two illustrations.

- Before the pandemic, the typical restroom had a standard sink with hot and cold-water handles, a soap dispenser next to the sink, and a paper towel dispenser either adjacent or across the room. To address COVID-19 safety concerns, the building operators upgraded the restroom to include an integrated sink system that offers touchless hand washing and drying without requiring users to walk back and forth across the restroom. There is no longer a trash receptacle filled with paper waste.

Figure 4. Commercial restrooms changed as a result of the pandemic

- Before the pandemic, restrooms had a door with a knob that required users to touch the doorknob to enter and exit the space. Automatic doors, or no-door designs, are now a more common solution to address COVID-19 safety concerns, removing a critical touchpoint.

- Before the pandemic, restrooms typically had manual-flush toilets, which many users used their feet to operate. These required frequent disinfecting. To address COVID-19 safety concerns, a sensor valve flushes the toilet without requiring physical contact, removing another critical touchpoint.

Accommodating Social Distancing

Another critical safety concern raised by the COVID-19 pandemic is the ability of a restroom to accommodate social distancing and avoid clusters of people gathering. Several strategies exist to address this, including the integrated sink system. Another approach is modifying the restroom layout with separate entrance and exit doors, which reduces close interaction through an efficient circulation path that gets people in and out.

Prioritizing Ventilation and Filtration

COVID-19 also increased focus on ventilation and filtration as safety considerations.

According to the Centers for Disease Control and Prevention (CDC): "When indoors, ventilation mitigation strategies can help reduce viral particle concentration. The lower the concentration, the less likely viral particles can be inhaled into the lungs (potentially lowering the inhaled dose); contact eyes, nose, and mouth; or fall out of the air to accumulate on surfaces.

Protective ventilation practices and interventions can reduce the airborne concentrations and the overall viral dose to occupants."[6] Exhaust fans should be functional and operate at full capacity when the building is occupied.

A higher standard is reached via hand dryers with built-in HEPA filtration. These dryers remove 99.999 percent of viruses from the airstream, blowing clean, warm air onto hands to dry them quickly and efficiently. This value is based on testing performed by LMS Technologies in 2023.[7]

Figure 5. Northwestern Memorial Hospital's control board decided to switch from paper towel dispensers to high-speed, energy-efficient hand dryers

The WELL Health-Safety Rating for Building Operation

In light of the COVID-19 pandemic, the International WELL Building Institute (IWBI) convened more than 600 experts to form the Task Force on COVID-19. Expanding on strategies from the WELL Building Standard, IWBI launched the WELL Health-Safety Rating for Facility Operations and Management in 2020. This rating helps building operators and organizations address occupants' health, safety, and well-being in their spaces. The rating also indicates to everyone entering a space that evidence-based measures have been adopted and third-party verified.

The WELL Health-Safety Rating is for operating buildings and spaces (not their initial design and construction). The rating includes more than 20 strategies (referred to as "features") across the following categories (referred to as "concepts"):

- Cleaning and Sanitization Procedures
- Emergency Preparedness Programs
- Health Service Resources
- Air and Water Quality Management
- Stakeholder Engagement/Communication

No single strategy is required. Instead, projects must meet a minimum of 15 total (spread across categories as they see fit).

High-Speed, Energy-Effcient Hand Dryers Support Features in the WELL Health-Safety Rating

Certain high-speed, energy-efficient (HSEE) hand dryers can contribute to third-party certifications like the WELL Health-Safety Rating.

Here are the relevant features:

- **Support Hand-washing:** This feature requires spaces to improve hygiene by offering soap containers and hand-drying support. It specifies acceptable methods for hand drying, including hand dryers equipped with a HEPA filter.
- **Reduce Surface Contact:** This feature requires spaces to assess high-touch surfaces throughout the project and implement temporary and/or permanent strategies to reduce the frequency or need for hand touch. As previously discussed, integrated sink systems with high-speed, energy-efficient hand dryers can reduce the required touchpoints in a restroom.
- **Improve cleaning practices:** This feature requires designers of spaces to develop cleaning and disinfection plans, including instructions, training, and recordkeeping. HSEE hand dryers may contribute to this feature by reducing the number of touchpoints that need to be disinfected, freeing up custodial time by reducing custodial tasks such as replacing paper towels and removing paper towel waste.

Figure 6. Kits are made for retrofitting existing paper towel dispensers and trash receptacles with ADA-compliant hand dryers

ADA Considerations

ADA compliance is a hot topic today, but creating physical locations designed to provide an equivalent experience to every user regardless of physical limitations is not a new concept. The Americans with Disabilities Act (ADA) was created in the 1990s to prevent discrimination and ensure all Americans could easily access public spaces. The ADA significantly impacted architects, causing them to adapt their designs to meet rigorous criteria.

Public restroom guidance includes:

- Ample space so that a single wheelchair can rotate 180 degrees.
- 60-inch width minimum toilet space, with the seat falling between 17 to 19 inches from the toilet base.
- Smooth, easy-to-hold grab bars installed along bathroom walls, especially near toilets.
- Sinks or countertops no more than 34 inches high, with space beneath for acceptable knee clearance.
- Faucets must be workable with only one hand.
- Hand dryers should be motion-activated and shouldn't extend more than 4 inches from the wall.

Selecting a hand dryer is often the final piece of the puzzle, and finding a model that fits the ADA criteria and is well-designed can be challenging.

FAQ—ADA-Compliant Hand Dryers

Q: What makes a hand dryer ADA-compliant?

A: For a hand dryer to be ADA-compliant, the appliance must be motion-activated and not protrude more than 4 inches from the wall.

Q: What is the ADA height for a hand dryer?

A: To be ADA compliant, all buttons and touch-free sensors on the hand dryer must fall between a height of 38 inches to 48 inches off the floor.

SUSTAINABILITY CONSIDERATIONS WITHIN COMMERCIAL RESTROOMS

This section discusses water use, energy use, materials use, indoor air quality, and operations of commercial restrooms.

Water

Creating water-saving restrooms addresses both environmental issues and cost savings. Water is likely the first thing that comes to mind when considering commercial restroom sustainability because it has a significant impact. The EPA states that "commercial and institutional buildings can account for 17 percent of the municipal water demand in the United States."[8]

Strategies to reduce water use include:

- Replacing or retrofitting toilets (with high-efficiency or dual-flush models)

- Replacing or retrofitting urinals (with waterless models)
- Replacing or retrofitting faucets (with high-efficiency aerators or sensor-based)
- Using alternate sources of water (such as graywater for flushing), and
- Tracking water use and leaks

Energy

Energy use goes hand in hand with water use reduction because of the energy required to pump, heat, treat and move water. Less water use means less energy use.

Strategies for reducing energy use in commercial restrooms include:

- Installing energy-efficient lighting.
- Installing high-speed, energy-efficient hand dryers, which use 80 percent less energy than conventional dryers.

The latest version of the LEED rating system for new construction heavily emphasizes energy reduction. Projects must meet minimum energy performance requirements and can earn up to 18 points by further optimizing energy performance. This equals the single largest potential credit in LEED.

Prerequisite: Minimum Energy Performance and Credit Optimize Energy Performance

This prerequisite and credit require projects to show how the building will reduce its energy use compared to a typical building. Certain high-speed, energy-efficient hand dryers may contribute to this credit as energy efficiencies associated with the dryer contribute to a reduction in proposed building energy use.

Materials

Material use in commercial restrooms concerns both the materials in the restroom and the waste generated by ongoing use. Design decisions can significantly impact the ongoing

material use of a commercial restroom. For example, designing a restroom with paper towel dispensers rather than hand dryers means that for the life cycle of the restroom, the building operator must supply paper towels. This is especially concerning, given that in October 2021, the National Resources Defense Council gave several popular paper towel brands an “F” on sustainably due to their reliance on virgin paper.[9] Sustainability in materials encapsulates their complete life cycle: from the extraction of raw materials to manufacturing to transportation and distribution to use to end-of-life management.

Several tools are available for selecting more sustainable materials:

- **Life Cycle Assessment (LCA):** An LCA investigates a product’s total environmental impact from the time of manufacture (Beginning of life) to the time of disposal (End of life)
- **Environmental Product Declaration (EPD):** An EPD is a standardized way of quantifying the environmental impact of a product by studying the raw materials and energy consumption during its production, use, and disposal. For buyers and specifiers, the EPDs are a disclosure tool that helps purchasers better understand a product’s sustainable qualities and environmental repercussions so they can make more informed product selections.
- **Health Product Declaration (HPD):** An HPD is a standardized format for the transparent disclosure of building product ingredients and associated hazards. HPDs are a tool that helps buyers and specifiers better understand the environmental and health impacts of a product’s materials to make more informed product selections.

HSEE Hand Dryers Support Credits in the LEED v4.1* Rating System

The latest version of the LEED rating system for Existing buildings contains several relevant parts (called credits) related to occupant safety and satisfaction that certain high-speed energy efficient hand dryers may contribute to. Let’s look at an example: The Green Cleaning credit requires spaces to conduct a Custodial Effectiveness Assessment. Certain high-speed, energy-efficient hand dryers may contribute to this credit by reducing custodial tasks, including replacing paper towels and removing paper towel waste.

TRUE Zero Waste

The final sustainability program we will discuss is TRUE Zero Waste. TRUE Zero Waste certification program enables facilities to define, pursue and achieve their zero waste goals, cutting their carbon footprint and supporting public health.

Like LEED, TRUE Zero Waste allows projects to earn points by achieving credits across various categories. For example:

- TRUE Zero Waste stands for Total Resource Use and Efficiency and was launched in 2013.
- TRUE Zero Waste is a whole-systems approach to change how materials flow through society, resulting in no waste. TRUE Zero Waste encourages redesigning resource life cycles to reuse all products.

- The TRUE Zero Waste Rating System applies to physical facilities and their operations.
- Minimum program requirements must be met (including diverting 90 percent of waste from the landfill), and then optional credits can be earned toward certification. Different levels of certification are available: Certified, Silver, Gold, and Platinum.
- Credits in the rating system are organized into 15 categories. All credits are optional; however, 31 credit points must be earned for a project to achieve certification.

Let's explore several credits that certain high-speed energy-efficient dryers may contribute to:

- **Right Size Collection Containers and Service Levels**: This credit requires projects to evaluate all containers to ensure appropriate sizes and schedules are in place. Replacing paper towels with high-speed energy efficient hand dryers may contribute to this credit by reducing the size of waste bins needed in restrooms due to the elimination of paper towel waste.
- **Document Materials Reduced by Commodity**: This credit requires projects to identify at least one material that is being reduced and document the reduction. Replacing paper towels with high-speed, energy-efficient hand dryers may contribute to this credit by eliminating paper towel waste.
- **Diversion**: This credit requires projects to divert at least 90 percent of their waste from the landfill. Replacing paper towels with high-speed, energy-efficient hand dryers may contribute to this credit by eliminating paper towel waste.
- **Carbon Footprint**: A related sustainability topic to consider is the carbon footprint or the total amount of greenhouse gases (including carbon dioxide and methane) generated by a space. All the topics just covered (water, energy, and materials) contribute to the carbon footprint of a commercial restroom.

Indoor Air Quality

The final sustainability topic in this article is indoor air quality, which directly impacts occupant health and well-being. Restrooms, in particular, contain several potential pollutants, including excess moisture and biological contaminants. And even some pollutants where you might not expect it: a study found 17 species of bacteria on paper towels. This pilot study concluded that a large number of culturable bacteria, including toxin producers, can be isolated from unused paper towels.[11]

"This pilot study demonstrated that a large community of culturable bacteria, including toxin producers, can be isolated from unused paper towels and that they may be transferred to individuals after handwashing. This may have implications in some industrial and clinical settings as well as in immunocompromised individuals."

There are several strategies to improve indoor air quality in commercial restrooms, including:

- Source control (not bringing in products that contain toxins).
- Moisture control (ensuring appropriate humidity levels).
- Cleaning (on a regular basis, using green cleaning best practices).
- Ventilation.

Key ventilation strategies include:

- Ensuring sufficient ventilation rates.
- Installing and using exhaust fans that are vented outdoors in bathrooms.
- Selecting fixtures, such as hand dryers, with built-in HEPA filtration.

OPPORTUNITIES FOR COST SAVINGS WHEN DESIGNING COMMERCIAL RESTROOMS

Sustainability will be a hard sell for developers if profits are negatively affected. The ideal scenario ties sustainable products and systems to long-term cost savings.

Water

Many of the sustainability techniques covered in the last section translate directly into monetary savings. For example, saving water saves money. Water costs and wastewater fees have risen faster than the Consumer Price Index (CPI) in the previous two decades.[12] This makes saving water more important than ever.

Energy

Similarly, saving energy saves money. According to one analysis, the average energy cost for commercial buildings is $2.10 per square foot.[13] The U.S. Environmental Protection Agency calculates that 30 percent of the energy used in commercial buildings is wasted. Less waste means more profits.[14]

Materials Durability

While not as immediate as water and energy savings, considering the durability of materials can pay off in the long term. The more often materials are replaced, the higher the cost.

Ongoing Costs of Consumables

Ongoing consumables refer to materials that are regularly used and replaced throughout the course of doing business. Commercial restrooms contain several ongoing consumables: toilet paper, seat covers, sanitary products, trash bag liners, and in some cases, paper towels. The cost of ongoing consumables adds up as items must be continually restocked. When the cost of a single case of paper towels is considered, along with delivery, freight, tax, and handling charges, it becomes clear why switching to high-speed energy efficient hand dryers and eliminating paper towels offers a significant cost savings opportunity.

Waste Hauling

The next consideration is what happens to all those ongoing consumables after use. Of course, they are thrown away. Waste hauling is a significant cost in operating a commercial building. Depending on the area of the country, disposal costs can range from $20 per ton to more than $100 per ton. This is another area where eliminating paper towels can save money by reducing the waste that needs disposal.

Maintenance Costs

Finally, maintenance costs in commercial restrooms should be considered. We learned earlier that commercial restrooms play an outsized role in soil level and occupant complaints. These relate to the maintenance of those restrooms. When making design decisions, it's essential to consider their impact on ease of cleaning and maintenance. When facility staff must spend time on clogged plumbing systems, for example, when a user flushes paper towels, the staff is diverted from other vital tasks, like sanitizing hightouch surfaces.

Labor Costs

Labor costs should be factored in when considering commercial restroom maintenance. Anecdotally speaking, an overflowing trash receptacle is a blatant sign of maintenance shortcomings. And because of behavior changes post-pandemic, building occupants and patrons are washing their hands more frequently. Consequently, discarded paper towels add up. But trouble ensues when the need for more frequent restroom cleaning butts up against a labor shortage. In some cases, there is inadequate labor to accommodate "the paper cycle," leading to empty dispensers, full trashcans, and bad patron experiences.

CONCLUSION

The design of commercial restrooms impacts the functionality of the building and user perception. Emphasis needs to be on safety, sustainability, and savings. Especially postpandemic, there is more hand-washing and more use of commercial restrooms. To minimize touchpoints where infectious diseases can be spread, facilities have been upgraded to include touchless toilet flushers, faucets, soap dispensers, and high-speed, energy-efficient hand dryers. Eliminating paper towels and the associated waste can help the bottom line. Giving the users of commercial restrooms a trouble-free and sanitary experience is more important than ever.

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SAVINGS CASE STUDY: GILLETTE STADIUM

High-speed, energy-efficient hand dryers at Gillette Stadium are better for the environment, are preferred by users, and save money

The New England Patriots have created a green dynasty at Gillette Stadium in Foxborough, Massachusetts. In addition to being the hallowed home of the New England Patriots, Gillette Stadium is a world-class entertainment facility that hosts everything from international soccer matches to concerts by Jay Z, Beyoncé, Taylor Swift, and Kenny Chesney. During what they call a full-stadium event, nearly 70,000 people crowd the stands—and they use the restrooms.

Since 2009, Gillette Stadium has used high-speed, energy-efficient hand dryers to cut costs, meet sustainability goals, promote restroom hygiene, and improve the guest experience. "The (HSEE hand dryer) is a win-win-win-win for us," says Jim Nolan, Chief Operating Officer. "First, it's better for the environment. Second, we are saving money while our staff is spending less time cleaning paper off the floor and refilling dispensers. Third, the staff is freed up to respond more quickly to fan issues. Fourth, and most important, fans prefer it to paper, giving them a better experience."

Equipped initially with paper towel dispensers, the stadium used an average of 6,264,000 paper towels annually, costing more than $50,000 for paper, maintenance, and waste removal. In September 2009, Gillette installed more than 125 HSEE hand dryers featuring exclusive, custom digital imaging cover technology throughout Gillette Stadium. Doing the math means 125 HSEE hand dryers do the work of 6 million paper towels annually. "The hand dryers reduce the cost and maintenance associated with paper towels in the stadium's restrooms," Nolan says.

The hand dryers represent a 95 percent cost savings compared to paper towels, eliminating their associated labor, maintenance, and waste. The HSEE hand dryers in the stadium are Made USA Certified with a dry time of eight seconds and use 80 percent less energy than conventional hand dryers. Dry time and energy use tests were performed by SGS International on standard HSEE hand dryers with a 0.8-inch nozzle to 0.25g or less of residual moisture, pursuant to the UL Environment Global Product Category Rules (PCR) for Hand Dryers.[10]

The dryers are BuildingGreen Approved and help facilities qualify for the most LEED credits. "We want to make sure our operations are as efficient as possible," says Jason Stone, Senior Director of Operations. "Having the (HSEE hand dryers), we're able to be more efficient in the bathrooms and provide our customers with a great experience."

Test Questions

Commercial Restroom Design: Safety, Sustainability, and Savings

1. According to the American Institute of Cleaning Sciences, which portion of a commercial building accounts for 50 percent of occupant complaints?
   a. Parking lots
   b. Restrooms
   c. Elevators
   d. Lobbies

2. Which percentage of consumers wash their hands three to 10 times a day?
   a. 5 percent
   b. 25 percent
   c. 50 percent
   d. 75 percent

3. Which standard is set by OSHA for commercial restrooms?
   a. Toilet facilities must be available at every worksite (except for mobile worksites).
   b. Hand-washing facilities must be provided and maintained in a sanitary condition.
   c. All restrooms are required to have running water, soap, and hand towels or air dryers.
   d. All of the above.

4. Which statement was made by the World Health Organization?
   a. Once your hands are cleaned, let them air dry.
   b. Once your hands are cleaned, don't touch anything until you get home.
   c. Once your hands are clean, wash them a second time.
   d. Once your hands are cleaned, you should dry them thoroughly using paper towels or a warm air dryer.

5. What did a study by the University of Arizona Health Sciences find regarding hand dryers vs. paper towels?
   a. Data suggests that hand dryers are superior.
   b. Data suggests that paper towels are superior.
   c. The breadth of available data does not favor one hand-drying method as more hygienic or safer than the other.
   d. Data suggests that air drying then using a paper towel is superior.

6. What percentage of viruses do HEPA filters in hand dryers remove from the airstream?
   a. 99 percent
   b. 99.9 percent
   c. 99.99 percent
   d. 99.999 percent

7. What does the acronym HSEE stand for regarding hand dryers?
   a. High-speed, economically efficient
   b. High-speed, energy-efficient
   c. Hyper speed, energetically elusive
   d. Highest Situation for Energy Excellence

8. What makes a hand dryer ADA-compliant?
   a. It must be motion-activated.
   b. It must not protrude more than 4 inches from the wall.
   c. All buttons and touch-free sensors on the hand dryer must fall between a height of 38 inches to 48 inches off the floor.
   d. All of the above.

9. The TRUE Zero Waste certification program enables facilities to define, pursue, and achieve their zero waste goals, cutting their carbon footprint and supporting public health. What does the acronym TRUE stand for?
   a. Total Resource Use and Efficacy
   b. True Reasoning in Utility Efforts
   c. Testing Reality for Usability and Efficiency
   d. Total Resource Use and Efficiency

10. Before Gillette Stadium replaced paper towel dispensers with high-speed, energy-efficient dryers, how many paper towels were used at the facility each year?
    a. More than 1 million paper towels.
    b. More than 3 million paper towels.
    c. More than 4 million paper towels.
    d. More than 6 million paper towels.

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Congratulations to the 2023 Student Merit Award Recipients!

For over 20 years, the Association of Licensed Architects has sponsored an annual Student Merit Awards Program to acknowledge architecture students who have exhibited exemplary achievements. In February of each year, ALA contacts participating schools and requests each school to nominate a student deserving of the ALA Student Merit Award. One award is provided for each degree program. There is no charge to the school for participating.

2023 ALA Student Merit Awards

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Judson University - Gina Misek
Judson University - Jarod Pletcher
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Miami University - Keenan Bellisari
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University of Notre Dame - Patrick Beck
University of Notre Dame - Anjelica Ketcham
Washington University in St. Louis -
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ALA ARCHITECTURE CONFERENCE

Keynote: Rusty Smith
Associate Director,
Rural Studio

SAVE THE DATE

Thursday, November 16 | 7:30am-4:30pm

ALA is excited to present its Fall Signature Conference, **Change is the New Norm.** The all-day hybrid event will be held Thursday, Nov. 16th from 7:30 am - 4:30 pm at the Mid-America Carpenters Regional Council, located in Elk Grove Village, IL.

We are pleased to welcome this year's keynote speaker Rusty Smith, Associate Director, Rural Studio, Auburn University's internationally recognized design-build program. Rusty's presentation is entitled, **Rural Studio and the Front Porch Initiative: Educating Citizen Architects for 30 Years.** The Rural Studio gives architecture students a hands-on educational experience while assisting the underserved communities of Alabama's rural Black Belt region.

Architects can earn up to 6 credits by attending.

Stay Tuned...
Registration will open in mid-September.

Association of Licensed Architects

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