

Lighting in Education

LED Lighting Retrofits for Schools Best Practices and Guidance 2022



Future Proof Your Lighting

Smart, Selectable & Controllable LED Lighting



U.S. DEPARTMENT OF
ENERGY

The Department of Energy describes the next generation of integrated classroom lighting systems as “a highly energy efficient, fully-dimmable, tunable/selectable white-LED lighting system, noting that classroom lighting must be flexible and easy to use to accommodate different teaching methods, and serve how students of all ages learn.

Classroom Lighting Design / LED Light fixtures for Schools and Educational Facilities

The role of lighting in knowledge acquisition and the process of learning is fundamental. Proper lighting design and application is critical in providing an environment that meets the needs of students and instructors, classroom lighting should support health, well-being and performance within the classroom. The priority of classroom lighting is to satisfy human needs such as visibility, task performance, visual comfort, social communication, health, safety and well-being. Proper color temperature, intensity (wattage), reduction of glare and the ability to eliminate flicker are essential in the design and application of lighting for a classroom.

Because lighting profoundly impacts numerous levels of human functioning such as vision, circadian rhythms, mood and cognition, its implicit effects on learning and classroom achievement cannot be dismissed. Studies have addressed how the quality and color of lighting can either impair or enhance students’ visual skills and thus academic performance. Classroom studies have shown proper LED lighting design and application can improve cognitive skills, lower error rates and boost productivity. Visual impairments alone can induce behavioral problems in students as well as level of concentration and motivation in the classroom.

Studies have shown that proper lighting design and application can drastically improve the behavior of students who are hyperactive or have learning disadvantages.

For years the question facing lighting designers and school administration has been, are we designing the lighting for students or for teachers. Proper application of white LED at 5,000 kelvin stops the production of melatonin and causes the students to be more alert and responsive in class. Its often referred to as “alert lighting”. Though this application may be the most appropriate for students, it may not be the most comfortable for teachers and administrators. The ability to provide the right application of lighting in different areas, considering all persons is crucial in developing a successful lighting project.

Lighting in Education Best Practices

The next generation of healthy, energy efficient, integrated classroom lighting systems

• Improved Student Concentration and Performance

One of the most important benefits of installing LED lights in classrooms is the improved academic performance of students. Studies have found that quality LED lighting can improve concentration and boost a student's learning ability. Selectable LED Lighting can improve listening, verbal communication, social skill development and comprehension. As a critical element of the design that greatly influences how well the classroom meets the needs of students and teachers.

Quality white-LED, provided with wattage options, color (kelvin) options, dimming capable and controls compatible, is critical in delivering the best lighting for the health, well-being, and highest level of performance for both students and teachers.

NetZero USA's True-White LED selectable retrofit solutions offer options for on-board wattage switching and color (kelvin) switching, are dimmable and controls compatible to maximize energy savings and performance.

• Less Irritation for Students by Eliminating Sub-Visible Flicker

According to the CDC, 1 in 44 children born today has some sort of Autism Spectrum Disorder (ASD), and according to the American Academy of Ophthalmology, over 80% of the population and over 9 million children suffer from photophobia or light sensitivity. Autistic students are especially susceptible to the effects of fluorescent lighting with specific sensitivity to the sub-visible flicker. Flicker is also an issue for teachers and other students that have photophobia or photosensitivity and are prone to migraines. Many LEDs and especially TLEDs flicker at a faster rate than fluorescents and produce the same disruptive sub-visible discomfort.

NetZero USA's LED retrofit products and new construction fixtures are designed and warranted to operate with no-sub-visible or strobing, providing an improved learning and work environment.

• Reduction in Hyperactivity

Color temperature (kelvins) has been shown to play an important role in students' health and performance. Studies show that cool color temperature can improve the behavior of students with learning disadvantages or hyperactivity disorder. Cool light color allows them to concentrate on projects and tasks

more effectively. Hyperactivity is related to stress conditions, which can be aggravated by the radiation produced by the fluorescent lights. When the exposure to the radiation is decreased, performance and behavior improve.

NetZero USA's Selectable/switchable LED Retrofit Panels allow on-board controllability with 3 different watt-age options and 3 different color (kelvin) options. Additionally, they are dimmable and controls compatible.

• Dimming and Controls Compatible

Most TLEDs, LED Tubes and many LED Fixtures and retrofits are not dimmable and therefore are not controls compatible. As stated by the U.S. DOE, "the next generations of classroom lighting systems as a highly energy efficient, fully dimmable, tunable/selectable true-white LED lighting system." With the long life a quality LED retrofit offers, it's crucial to be able to integrate with controls today and/or in the future.

All NetZero USA's products are dimmable and controls compatible.

• Emergency Lighting Compatible

Most TLEDs, LED Tubes and some LED retrofits are not compatible with emergency lighting and are not UL924 compliant.

All of NetZero USA's LED Retrofits and new Fixtures are emergency compatible and conform to UL924.

• Energy Savings

In many school districts, energy cost is second only to salaries. Schools that install high quality LED lighting retrofits (as outlined by the U.S. DOE), won't just see increased academic performance, they'll also see significantly decreased energy bills. All LEDs though, don't save money or at least don't produce the energy savings anticipated. Most LED products are affected by the power quality of the facility they're being installed in. Many LED products can run much higher wattage than they claim in their specifications.

NetZero USA's LED retrofits and new construction fixtures are built to perform 24/7/365 and provide consistent and long-life energy savings. NetZero USA provides a writ-ten "PERFORMANCE GUARANTEE" stating that we guarantee that our products will perform at or below their stated wattage in their respective specifications, regardless of the facilities power quality or other factors.

• Maintenance Savings

Every classroom, hallway, bathroom, gym, locker room and offices have lighting, and the number of ballast and lamps in a school that maintenance workers have to replace can number into the thousands and in some case into the tens of thousands. Schools using fluorescent lamps and ballast require maintenance crews to spend a significant portion of their working hours replacing lamps and ballast. Those lights not easily accessible, like those found in gyms and other spaces with high ceilings, often require lifts and equipment or contracting out to an electrician.

NetZero USA's warranties provide not only for material but also for ON-SITE WARRANTY FULFILLMENT. If any NZUSA light fails for any reason (no small print) during its warranty period, NZUSA will replace it ON-SITE at your facility through our NZUSA maintenance division.

• Lens Browning

Two of the biggest issues in the LED industry are the problems of "lens browning" and "color shifting". LED retrofits and new LED fixtures are subject to lens browning or developing brown or black random streaks or spotting on the lens. Lens browning occurs when a LED manufacturer chooses to cut cost and pricing by using recycled plastics or low quality plastic lens in their lens manufacturing. Several factors, including but not limited to poor heat synch, over driving the diodes will cause the recycled plastic to react and brown across the lens.

NetZero USA only uses "Virgin Acrylic Powder" in the production of its lenses and warranties against "color shifting".

• Color Shift

Color shift, also known as color maintenance and chromaticity shift, has been a issue in the lighting industry for a long time. Cheap, poorly made LED solutions, TLEDs, LED tubes and new LED fixtures are notorious for color shifting after just a few hundred hours of operation. A row of lights (diodes) emitting a significantly different color is a common sight when these products are used. With all the benefits a quality LED lighting retrofit can bring to a learning or work environment, all those benefits will be negated and the result will be a more difficult environment to focus in.

NetZero USA's LED retrofits and new fixtures are designed to avoid any color shift by using quality components and binned diodes. Binned diodes (chips) are diodes (chips) that are individually tested for voltage, color and output and then grouped together for manufacturing. Additionally, NetZero USA LED products deliver True-White LEDs by using superior components, and a higher level of phosphorus in the chip package. Advanced thermal design and providing consistent current to the diodes (chips) as-sures that NZUSA LED lighting will not color shift. These components and manufacturing processes allow NZUSA to WARRANTY AGAINST COLOR SHIFT.



• LED Driver Replacement Guarantee

In any LED product, whether it be a LED retrofit or a new construction LED fixture, the driver is the weakest component. Driver replacement has become a huge issue within the LED industry. Most LED manufacturers now provide a pass-thru OEM warranty for the driver and exclude it from their warranty. Additionally, LED drivers are unlike fluorescent ballast in that when a driver fails, you can't just simply purchase a new driver as a replacement. Every LED product, light, retrofit, new fixture, etc., has a very specific power configuration of volts and amps that drive that particular LED product. Installing a new driver that doesn't match the original driver configuration will either over or under drive the LEDs and dramatically shorten the life and performance of the retrofit or fixture.

NetZero USA warranties 100% of all the components in its products with NO OEM pass-thru warranties.

The NetZero USA "LEGACY DRIVER GUARANTEE", guarantees that NZUSA will have the correct driver for you to purchase for an additional five years after the warranty expires. Having access to the correct driver replacement allows you to realize the maximum life expectancy of the technology and in some cases up to 30 years.

• Warranty

Warranties in the LED lighting industry have become almost a joke, with few manufactures wanting to stand behind their products. Most manufactures use pass-thru OEM warranties, and will not warranty or guarantee components or performance of their products. Most state that there is no representation that their products will perform or save any energy in any installation. Their warranties are full of denials and small print, leaving the decision to warranty any failed product completely up to the manufacturer.

• NetZero USA's Warranties are different:

- NZUSA warranties 100% of all the components in all of its products.
- No OEM pass-thru warranties.
- No exclusions (simple, if a NZUSA light fails...we replace it).
- Written performance guarantee.
- No pro-rated values, (full value for the full term of the warranty).
- All NZUSA LED products come with a 10-year material warranty.
- All NZUSA installations come with a 10-year labor warranty.
- When installed by NZUSA, all warranty is performed by the NZUSA Maintenance Division ON-SITE at your facility.



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