

**SIX**  
**PROBLEMS**  
WITH YOUR  
**EMERGENCY LIGHTING**  
AND HOW TO SOLVE THEM

Cyalume Technologies, Inc.



IN THIS PAPER, WE WILL  
DESCRIBE **SIX COMMON  
PROBLEMS AND RISKS  
WITH EMERGENCY  
LIGHTING PLANS**  
AND HOW THEY CAN  
UNDERMINE PERSONAL  
SAFETY AND EMERGENCY  
EGRESS IN THE ABSENCE  
OF NORMAL LIGHTING.

We will also explore how industrial-grade light sticks were designed precisely to solve those problems.

Most industrial emergency plans are just a shot in the dark – and worse, most organizations don't even realize it. Nowhere is this truer than emergency lighting, where most industries meet only minimum regulatory requirements, inaccurately believing that means they are adequately prepared for a serious power outage or emergency situation – only to discover they are actually light years behind where they need to be. That's because decision-makers and executives systematically underestimate the impact of six areas of risk and vulnerability in their current emergency lighting plans.

**PORTABILITY  
USAGE DURATION  
RELIABILITY  
ILLUMINATION  
SHELF LIFE  
MAINTENANCE**

These risks mean that emergency lights often turn out to be too dim for staff and first responders to perform urgent tasks. Irregular maintenance means that the emergency lights won't work at all. A lack of portable lights leaves evacuees huddled in the dark outside and/or entire interior rooms and hallways draped in darkness.

These risks are not hypothetical or abstract. After a major, multi-day blackout struck across the northeastern U.S. and Canada in 2003, the majority of emergency plans established by regional hotels didn't work.

Nearly half (48%) didn't have any emergency power available for the duration of the outage, and nine out of ten (87%) had their lights go out completely. Some of the hoteliers had to resort to candles, one of the most dangerous forms of emergency lighting due to fire risk. Even though a majority of hotels had emergency lighting in place, their plans simply proved to be lacking. In all, a Cornell University study of the event found that “ensuring a better supply of substitute lighting topped the list of things managers would have done differently to prepare for the blackout.”

**“LUCKILY, ALL OF THESE ISSUES  
ENJOY A COMMON SOLUTION THAT  
EXCELS IN ALL SIX AREAS: LIGHT  
STICK DEVICES, A LIGHT SOURCE  
DEVELOPED BY CYALUME.**



**Light stick devices provide exceptional light** for first responders, customers, guests, patients, residents and workers to (1) perform urgent tasks without adequate power supply and (2) safely facilitate orderly emergency egress in potentially dangerous crowded and panicked situations.

To learn how to evaluate your current emergency lighting solution in terms of these risks, and to understand how industrial-grade light sticks reduce these vulnerabilities, read on.

## SEE YOUR EMERGENCY PLANNING **IN A NEW LIGHT**

**The question is not whether you already have emergency plans in place** – all business properties must have some kind of emergency lighting in place, usually battery-run emergency lights, in order to meet code requirements. Those plans usually provide a good start; they just fall short (see charts p.5). That’s why so many of the hotels mentioned found their solutions didn’t work as planned – they suffered from too many potential failure points with no failover plans, which is true of most industries, so failure rates skyrocketed.

And even if the battery-powered emergency lighting works perfectly, it may not meet all functional needs in an emergency situation. For example, technicians and first responders may have to perform urgent, focused tasks inside your facility as they work with or inside recessed access panels and remote areas, while emergency egress can create unexpected contingencies. The minimal amount of planning required by code cannot be guaranteed to provide adequate lighting under all relevant use-case scenarios.

**INSTEAD, WHERE MANDATED  
EMERGENCY LIGHTS FALL SHORT,  
ALTERNATIVE SOLUTIONS SHOULD  
BE EVALUATED AND UTILIZED  
TO FILL THE GAP.**

We’ll explore some alternatives, like flashlights in the context of these problems. Only one option was actually designed to address and eliminate all six issues: light stick devices.

Light sticks were developed specifically to solve these common issues. Cyalume partnered with the U.S. Navy in the 1960s to develop a new kind of light: disposable, flexible and highly functional. The military wanted a light source that would be immune to environmental conditions and safe to use anywhere. Ideally, the solution would require no upkeep or replacement. **Enter the light stick device.**



### HOTELS

Guest safety and satisfaction are the top priorities of any reputable hotel, and light sources in power outages and emergency situations are key to both conditions. Hoteliers as reputable as the Ritz Carlton and Omni have begun distributing and storing light sticks in rooms to ensure everyone has access to a reliable, portable and disposable light source.



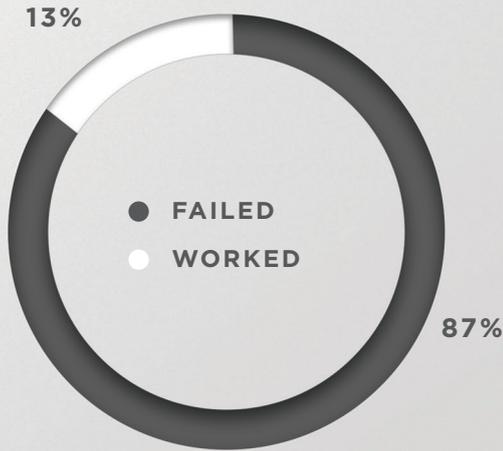
### HOSPITALS

Hospitals must invest heavily in generators and battery-powered emergency lighting to protect patient well-being, but even those preparations can't ensure personal light sources during emergency egress. Light stick devices can provide in-room light bright enough to reassure anxious patients and light up hallways during evacuations.



### MARINE

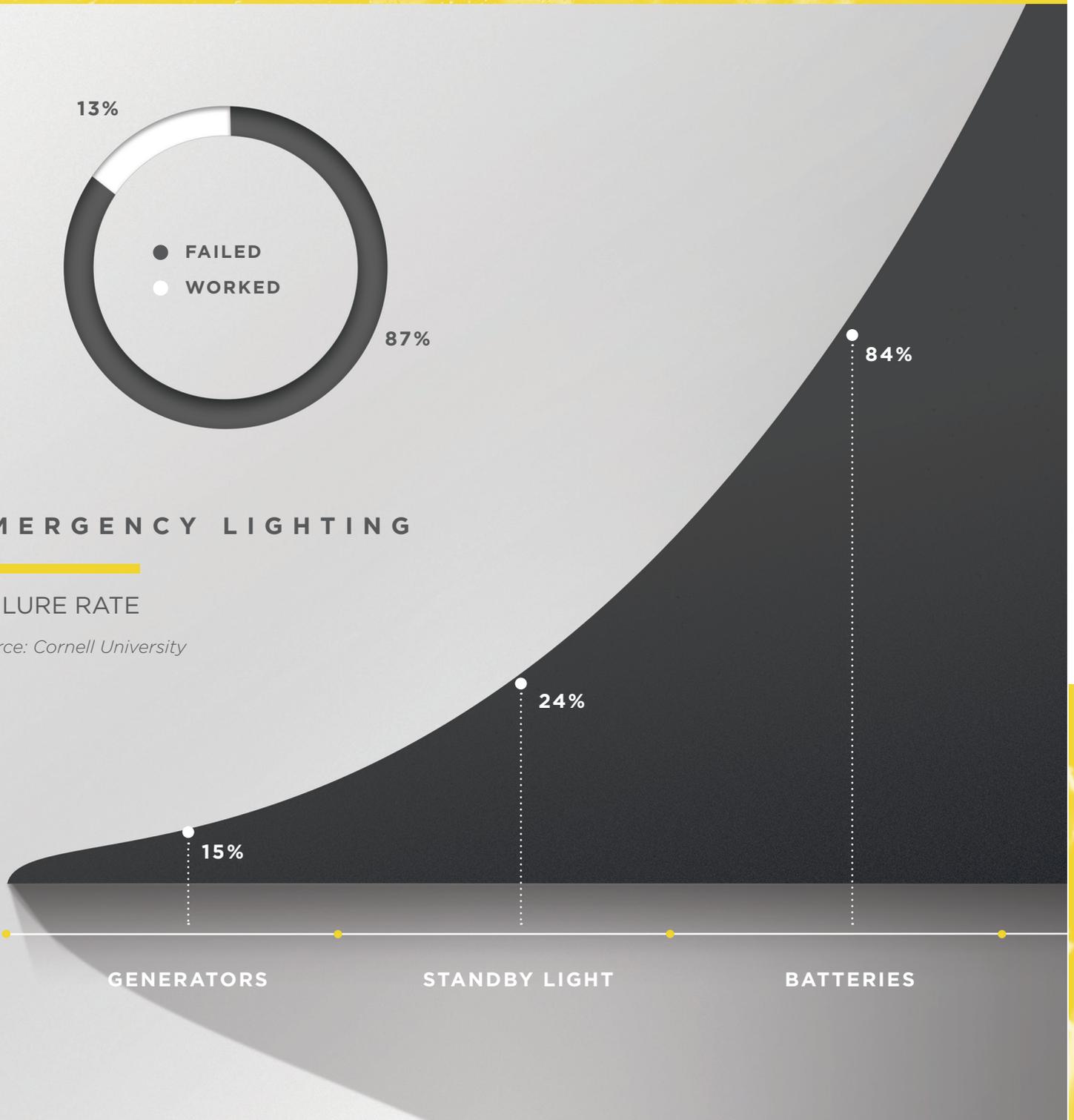
The cruise industry has long battled safety issues, and just because the environment goes dark, cruise personnel must stay on duty. Workers can snap a light stick and have a portable light by which they can work, find their way through the ship, and calm rattled guests.



## EMERGENCY LIGHTING

### FAILURE RATE

Source: Cornell University



# 01

## PORTABILITY

RISKING THAT PEOPLE WILL MOVE AND MIGRATE INTO AREAS WITHOUT EMERGENCY LIGHTING.

**In emergency egress**, people do not stand still, and they do not always start or end up where stationary emergency lights have been placed. Every facility needs a grab-and-go solution that individual workers and customers can take with them. Portable lights can be life-savers, as emergency lighting can be sparse in interior areas away from emergency exits, and non-existent outdoors after emergency evacuation.

Most mandated emergency light solutions fail entirely on this count: they are typically affixed to the wall and wired to either an internal battery pack or a larger, more powerful central battery. Flashlights are obviously portable but suffer from many of the other risks listed in this paper (for a closer look at flashlights as an emergency lighting option, see the sidebar “What About Flashlights?”).

Light sticks, by contrast, are small enough to easily fit in a hand or pocket. They can be distributed directly to guests, kept in a drawer in rooms, or posted in a wall-mounted LightStation™ installed near emergency exits and/or throughout a facility. Light sticks have no “parts,” making them the ultimate grab-and-go lighting solution.

# 02

## DURATION

RISKING THAT YOUR CODE-MANDATED EMERGENCY LIGHT WILL FAIL BEFORE POWER IS RESTORED

**As the hoteliers in 2003 discovered**, emergency lights may not last through a power outage or emergency event. They may not even last through a complete evacuation! At minimum, emergency lights must last as long as it takes to evacuate the premises. Unfortunately, the duration of battery-powered lights can last as little as an hour, and recall the chart on page 2: a staggering percentage of batteries fail when needed most.

There are many factors that affect duration: battery size, capacity and age; regularity of maintenance; environmental conditions; the integrity of connective parts. For example, emergency lights connected to a central battery could fail at any one of numerous points, including the battery itself, the wiring, the circuitry, and more. And if a central battery fails, the entire emergency system fails.

Batteries also lose charge as they age; a battery that hasn’t been replaced recently may last only half as long when it’s needed most.

The optimal solution to this risk: a product that utilizes neither batteries nor relies on any electrical or mechanical components that could fail. The concentrations can be adjusted with fine-tuned precision to deploy sticks that will stay alight for predictable time periods, anywhere from 5 minutes up to 24 hours or more. You purchase a light stick for a certain time period, and that’s how long it lasts.

**We need to emphasize “industrial-grade” light sticks here. Glow sticks from the local party store use weaker chemical components that won’t produce sufficient brightness nor last as long.**



## WHAT ABOUT FLASHLIGHTS?

Flashlights are best suited for search-and-rescue operations, and therefore work well for first responders. For evacuees, workers, residents and customers, however, reliability and cost issues reduce the value of flashlights.

That flashlights are a common solution doesn’t mean they’re an ideal one. In the 2003 blackout, when one out of three hotels did not have enough flashlights, hoteliers made a run on hardware stores.

That’s a bad situation compounded by the fact that these devices also tend to disappear, so that they’re not available when needed most and then require expensive replacement.

In other words, it takes a lot of flashlights to provide ample lighting for everyone in an emergency situation. Unfortunately, flashlights are breakable, subject to corrosion, finicky, and depend on batteries that discharge quickly even when not in use.

# 03

## RELIABILITY

RISKING THAT EMERGENCY  
LIGHT WON'T WORK AT ALL  
WHEN IT'S NEEDED MOST

**Many lighting solutions have potential points of failure** and they may not work when needed most: batteries die, wires fail, devices break. In many cases, reliability is tied directly to expensive, labor-intensive maintenance; other options need only proper storage to work 100% reliably.

We've already touched on this issue, which overlaps with duration. Reliability is not an all-or-none. An emergency light that doesn't last long enough is little better than an emergency light that doesn't work at all. Another reliability consideration: will the light be there when you need it? Many facilities invest heavily in flashlights, only to find the devices "walk away" and disappear, or their components have corroded over time.

Failure rates among light sticks are almost nonexistent; as long as they're stored properly in a dry, dark place, they'll store for years with zero maintenance. If a facility is concerned about them "walking away" like flashlights, an easy fix is to install LightStations™ that serve as emergency dispensers of a number of light sticks. Even then, light sticks are significantly less expensive compared to flashlights and other emergency light solutions and can be obtained in quantity and replaced regularly.

**EMERGENCY LIGHTING ALSO PROVIDES PSYCHOLOGICAL RELIEF IN STRESSFUL AND POTENTIALLY UNSAFE EMERGENCY EGRESS; BEING ABLE TO HAND EACH PATIENT, GUEST OR CUSTOMER THEIR OWN RELIABLE LIGHT SOURCE PROVIDES ENORMOUS COMFORT.**

# 04

## ILLUMINATION

RISKING THAT EMERGENCY  
LIGHT WILL BE TOO DIM TO MEET  
FUNCTIONAL NEEDS.

**The luminosity (and even colors) must match** the needs of the areas in which the lights will be used, e.g., bright lights where first responders will be working inside a building, sufficient ambient lighting for exits, spotlight options for searches, different colors to help workers and first responders, etc.

Generally speaking, illumination is not the biggest risk; most emergency lights will provide adequate light, assuming they work reliably. That said, emergency planners don't always account for specialized needs. Utility workers and first responders, for example, may need to access remote or recessed areas out of direct light, and they may need to perform fine-motor work to repair sensitive equipment or provide health care to injured people. These tasks can require special lighting needs.

Light sticks were originally designed specifically for military personnel to be able to accomplish all key tasks in otherwise complete darkness, from eating meals to reading maps to path-finding. Once again, do not confuse these light sticks with party-store glow sticks: only the right chemical concentrations can produce intensely bright light. Flare-alternative ultra-bright lights sticks, for example, can flash up to thousands of candela, rivaling safety flares and generating visibility up to one mile, but you won't find them at your local party store.

# 05

## STORAGE LIFESPAN

RISKING THAT EMERGENCY LIGHTS WILL FAIL BEFORE THEY'RE NEEDED MOST

**Emergency light sources don't have an infinite lifespan** even when just being stored; batteries drain even when not in use, and as one hotel manager told Cornell University researchers, "Once the batteries drained in our hallway lights, the hotel literally went black." Compounding the problem, ambient conditions like temperature limits can greatly affect lifespan. A battery for a self-contained emergency luminaire (i.e., an industry-grade battery) may last for four years if stored under proper conditions.

The chemical components used in industrial-grade light sticks are both safe and have a reliable shelf-life of years, as long as they're stored properly. Even with no maintenance, they'll work for their intended duration at their intended brightness.

“BEND IT, SNAP IT  
SHAKE IT, THAT'S IT.”

# 06

## MAINTENANCE

RISKING TIME AND MONEY ON NON-STOP, LABORIOUS UPKEEP AND MAINTENANCE TASKS

**This risk underlies many of the others:** mandated emergency lights and certain alternatives will work reliably, with the intended output and duration, only by investing resources – money and staff hours – into continuously maintaining them. That maintenance can require specialized personnel, tools, technologies and methods, depending on the specific lighting selected. Staff expenses apply too: for example, maintenance checks of systems powered by a central battery require a competent engineer. Some solutions must be maintained as often as daily (with a visual inspection), with other weekly, monthly and annual tasks on the maintenance calendar.

As a result, supplemental or complementary emergency lighting options should ideally require no maintenance at all, rather than adding to the workload. The obvious solution is a low-maintenance or maintenance-free option. With shelf-stable ingredients, light sticks can be left untouched for years, and they'll still reliably work.

**Electricity is a beautiful thing**, but only as long as power is available and all of the electrical components remain in prime condition. But where electricity falls short, chemistry shines bright: simply by combining the right chemical ingredients, facilities of all kinds can ensure a bright, reliable, non-toxic and safe emergency light source that can be obtained at quantity easily and quickly.

Light stick devices can amply fill the functional needs left unmet by minimum lighting codes, bringing a “value added” component to facility preparedness, in the words of Olan Johnston, an Emergency Preparedness Specialist with Evolve Technologies. The ultimate proof is the bottom-line: as Johnston says, “Most customers are pleased with their decision to purchase and order more light stick systems after their initial order.”

**Ideal for emergency egress and power loss events, industrial light stick devices are safe, easy, cost-effective and safely disposable. They give every person their own maintenance-free light source, easing crowd control and calming anxiety and panic.**

**Paired with regulation-mandated light sources, they cover every need.**

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