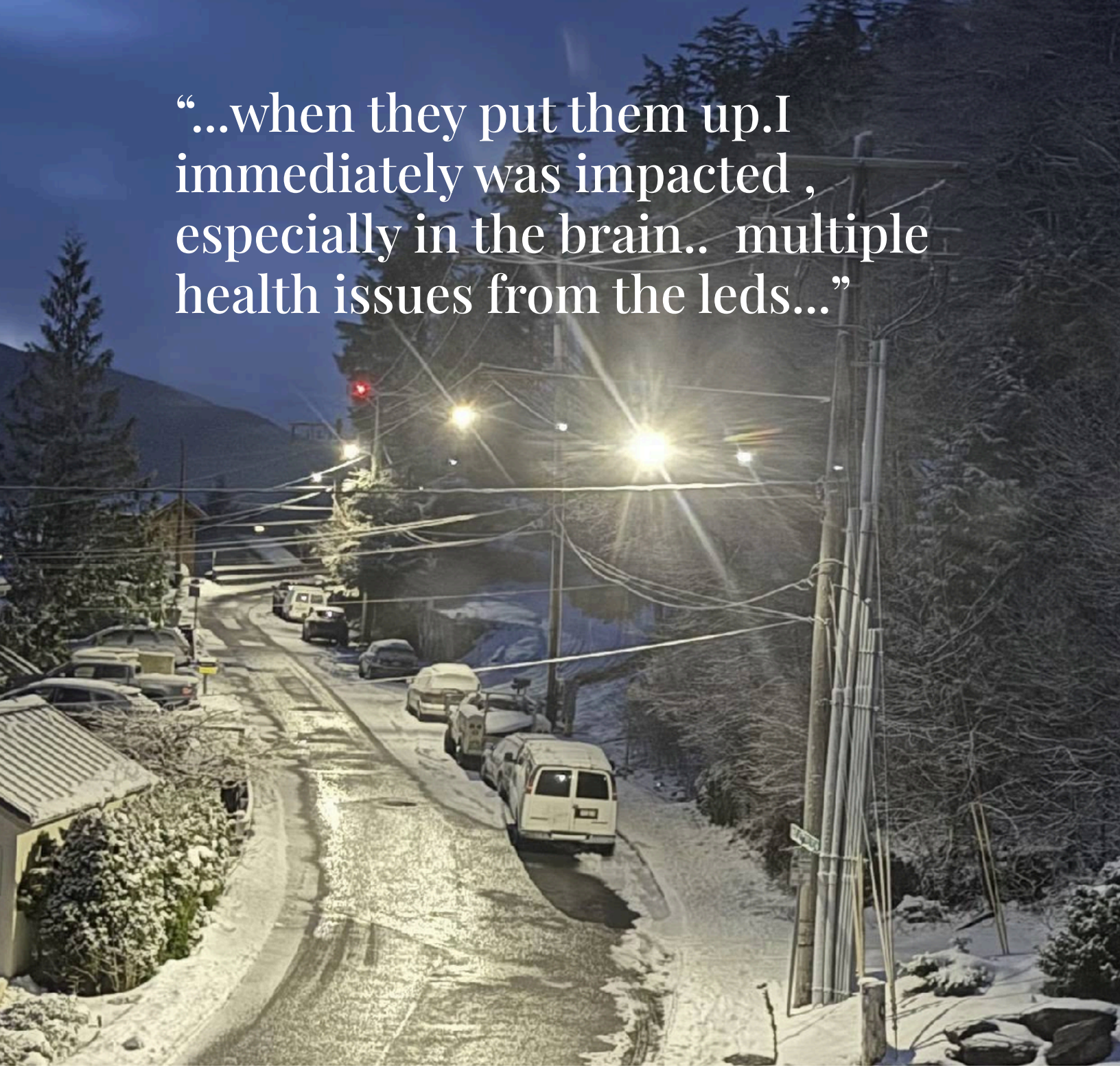
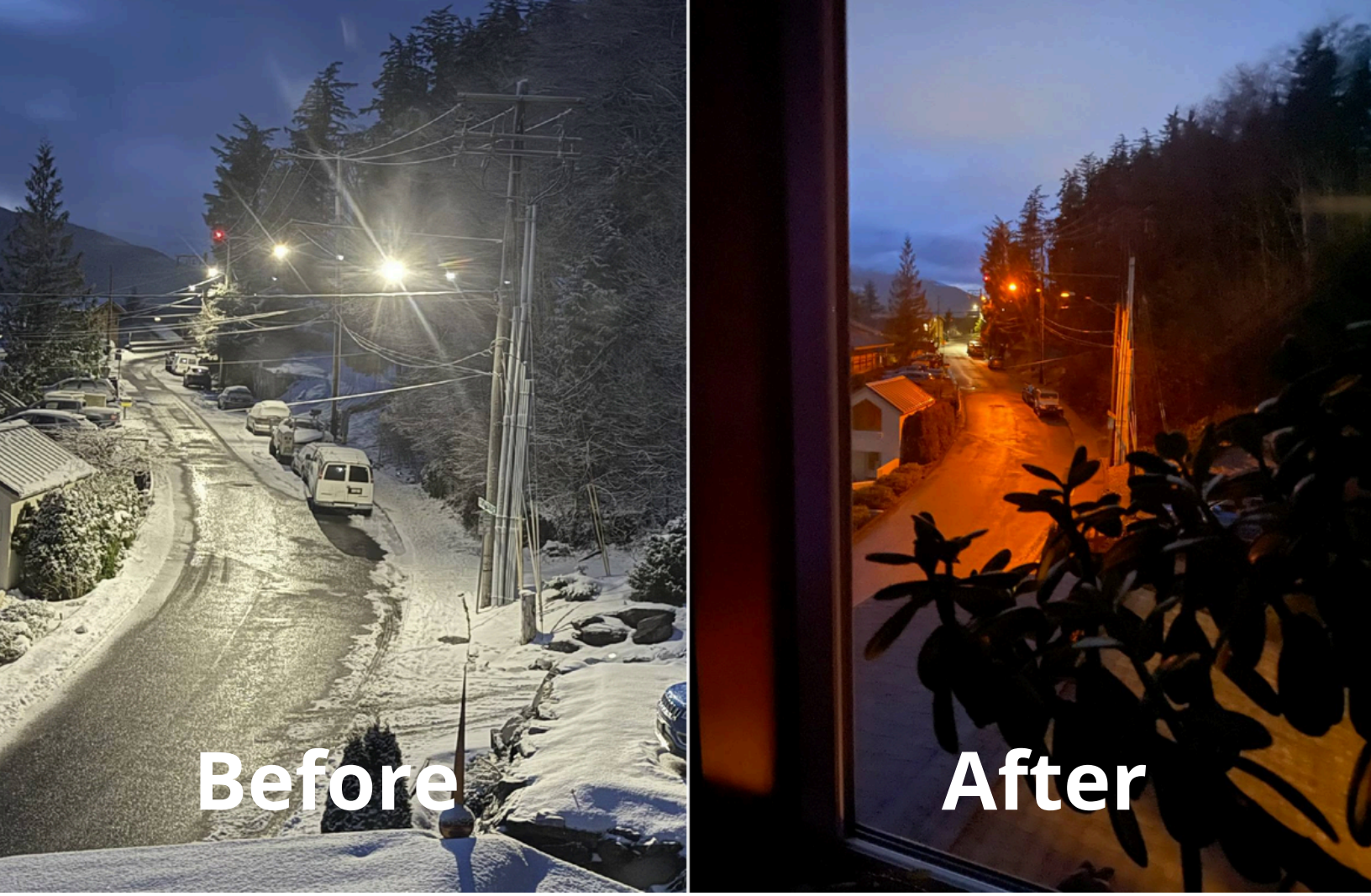
GLOW OBJECT

FUTURE CITY

LIGHTING



Under the ADA (28 CFR § 35.105), public entities maintain a non-discretionary obligation to evaluate whether new technologies, such as high-intensity LED infrastructure, create discriminatory barriers for residents with neurological or sensory disabilities. While this regulatory requirement is often overlooked during rapid modernization, failure to address these "program accessibility failures" can expose a city to significant legal liability and federal funding risks. We provide the strategic expertise to help your administration mitigate legal risks and align with ADA accessibility standards through inclusive, science-based lighting solutions.



Ketchikan, Alaska — Community Lighting Pilot

On April 3, 2026, the **city of Ketchikan** enabled three Low Pressure Sodium (LPS) streetlights supplied by **Glow Object** as part of a community-led lighting pilot supported by the **Soft Lights Foundation**.

The project replaced harsh cool-white LED streetlights with soft amber LPS lighting featuring virtually no blue light emission. Residents reported that the new lighting felt softer, less intrusive, and more comfortable during snow and rain conditions.

Community feedback has been overwhelmingly positive. One resident shared:
“All the neighbors love them… people who came to see them absolutely love them and want all the lights to go back to this.”

Residents reported improved nighttime comfort and better sleep after the installation.

The before-and-after photos show a dramatic reduction in glare, reflected brightness, and skyglow while still maintaining roadway visibility.

This pilot demonstrates how low-blue-spectrum lighting can improve nighttime comfort, reduce visual harshness, and create a calmer street environment for residential communities.

STREETLIGHTS

Pros
- Very high luminous efficacy
- Very low glare, uniform light
- Minimal light pollution

Cons
- Poor color rendering
- Limited use where color recognition is required

Pros
- High efficacy
- Long lifespan, low maintenance
- Directional lighting

Cons
- Blue-rich spectrum may cause glare or discomfort
- Potential for light pollution if not well designed
- Higher upfront cost

Pros
- Good color rendering
- Suitable for areas needing visibility

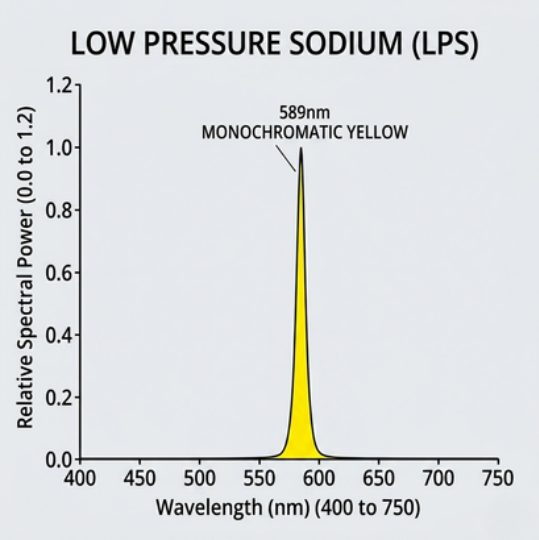
Cons
- Shorter lifespan
- Higher maintenance costs
- Lower energy efficiency

Pros
- Proven and widely used
- Warm light with decent efficiency
- Lower upfront cost than LED

Cons
- Poor color renderingX
- Light output decreases over time
- Less precise light control

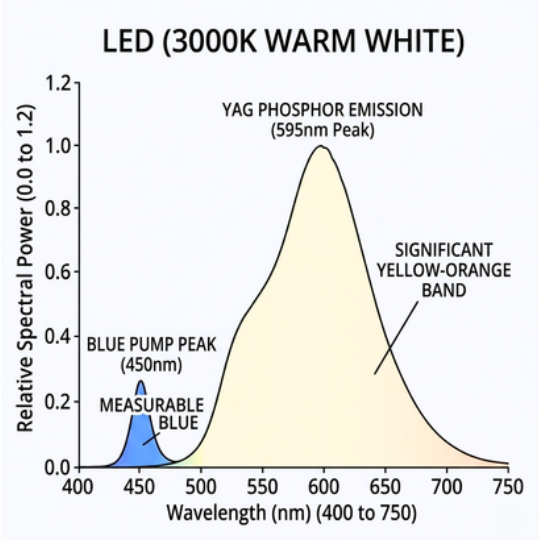
Blue Light Comparison

Exposure to blue light**, particularly at night, impacts human health primarily by disrupting the circadian rhythm and suppressing melatonin secretion, which is linked to increased risks of hormone-dependent cancers (breast and prostate), metabolic disorders, and mood disturbances, while its high-energy intensity serves as a known trigger for migraines, photo-sensitive epilepsy, and exacerbation of neurological fatigue.



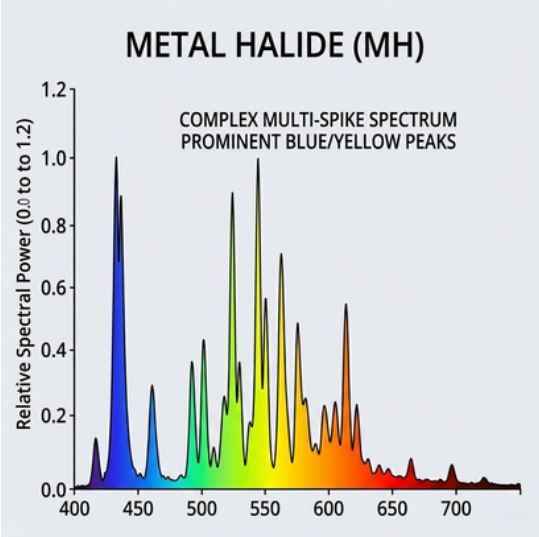
Low Pressure Sodium (LPS)

Zero Blue Light



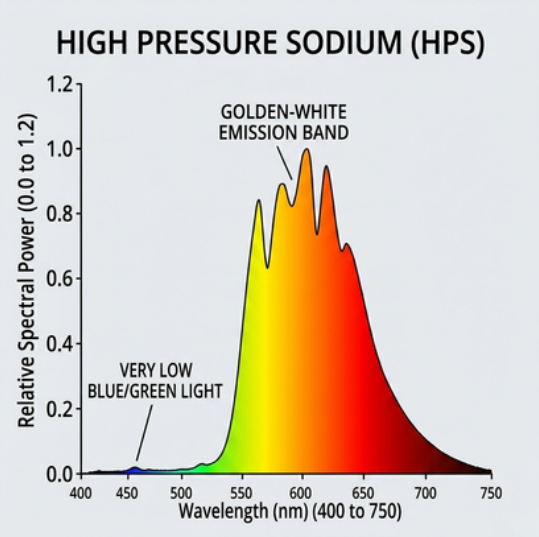
LED (3000K Warm White)

Measurable Blue Light



Metal Halide (MH)

Signaficant Blue Light



High Pressure Sodium (HPS)

Very Low Blue Light

Low Pressure Sodium Light
The Strategic Choice for Healthy Cities

While cities shift to LED, the hidden costs of Blue Light Pollution and Reduced Visibility are rising. Low Pressure Sodium (LPS) provides a superior specialized solution: unrivaled fog penetration and True Zero-Blue safety. Unlike "Amber LEDs" that merely mask blue light, LPS is physically incapable of emitting it. Adopting LPS ensures the highest standards for Public Health and Extreme Road Safety.

1. Public Health: Zero Blue Light Hazard

Unlike standard white LEDs which exhibit a massive energy spike in the 450nm (Blue) range, LPS emits a near-monochromatic yellow light at 589nm. This is outside the peak sensitivity range for melatonin suppression.

- **Circadian Protection:** Minimizes sleep disruption for residents in high-density urban areas.
- **Biologically Friendly:** Reduces the impact on urban wildlife and nocturnal ecosystems.

2. Public Safety: Unmatched Fog & Rain Penetration

Performance Metric	Low Pressure Sodium (LPS)	Standard White LED
Light Scattering	Minimal; long wavelengths (Yellow) bypass particles.	High; short wavelengths (Blue) scatter easily.
Visibility in Fog/ Smog	**Superior; creates high-contrast silhouettes.**	Poor; creates a "White Wall" glare effect.
Glare Reduction	Gentle on the eyes; reduced optical fatigue.	Sharp; high-intensity point source glare.

3. Maximum Luminous Efficacy

LPS provides 100-200 lm/W, the highest conversion efficiency of electrical energy to visible light. In applications where superior contrast and object detection are critical for safety (e.g., highways, tunnels, perimeters), LPS delivers the lowest operational cost per lumen.

4. Ecological Protection: Insect & Pest Mitigation

LPS is scientifically proven to be the most "insect-neutral" lighting source because its monochromatic 589nm spectrum falls outside the visual sensitivity range of most nocturnal insects, effectively eliminating the "vacuum cleaner effect" caused by white LEDs.

LPS Case Studies:
Healthy Lighting Benchmark

CRITICAL CASE ANALYSIS: The San Jose Experience

The Risk of "Early LED Adoption": San Jose initially converted to high-CCT (white) LED, leading to widespread public backlash due to "intrusive glare" and "blue-light sleep disruption." The city was later forced to spend millions in additional funding to retro-fit warmer filters—a problem **LPS inherently solves** with its naturally warm, low-scatter yellow light that residents demand and the law requires for public health.

Roadshow: More LED streetlights on hold in San Jose

More frustration caused by the Highway 101-Willow Road interchange in Menlo Park.

The Mercury News | Feb 15, 2018

1. Flagstaff, AZ - The "Gold Standard" for Healthy Nights

Flagstaff utilizes low-glare LPS to protect residents' circadian rhythms and prevent neurological fatigue. It is the leading global model for balancing urban safety with ecological integrity.

Outcome: Zero resident complaints; 100% biological clock protection.

2. Belgium National

Belgium strategically powers its 100% backbone highway grid with LPS, a deliberate engineering choice that ensures unrivaled visual contrast and fog penetration for maximum driver safety where LEDs fail.

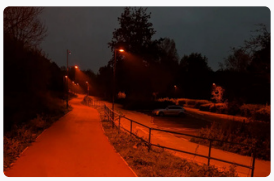
Outcome: Maximum visual contrast at high speeds; zero hydroplaning glare.

3. The Palomar Mountain, CA

San Diego County mandates LPS in observatory zones to protect deep-space research, as its monochromatic 589nm light is the only spectrum that can be 100% filtered out by astronomers to ensure a "pitch-black" sky.

Outcome: Zero spectral interference; protection of the scientific economy.

4. UK Nature Reserves



The UK mandates LPS zones in critical nature reserves to protect rare nocturnal mammals, a vital ecological choice that prevents the biological disruption and habitat loss caused by the blue-light spectrum of LEDs.

Outcome: Non-disruptive to the specific biology of light-sensitive species.

*Project and case study information is compiled from publicly available sources and is believed to be accurate at the time of publication. Specifications and project details may change without notice.

LOW PRESSURE SODIUM LIGHT (LPS OR SOX LAMP)

SOX lamps produce light by passing an electric current through vaporized sodium metal within a vacuum

Technical Summary:

- **Efficiency:** Leading efficacy up to 180+ lm/W; converts electrical input into light with minimal heat waste. (Source: Philips/Signify)
- **Safety:** Monochromatic yellow (589 nm) provides **30%+ better visibility in fog/rain** compared to white light. (Source: IES)
- **Lifespan:** Rated for 18,000 hours with a high survival rate of 95% at 10,000 hours. (Source: Master SOX Specs)
- **Environment: 0.0 mg Mercury (Hg); the only discharge lamp meeting strict dark-sky and insect-neutral requirements.** (Source: EU Energy Labelling)
- **Fiscal:** Low-cost ballast system allows for modular, 15-minute field repairs without total fixture replacement.
- **Reliability:** Instant re-strike (after brief cooling) and stable operation down to -40°C.

Note; LPS lamps require a ballast to operate

55W Low Pressure Sodium Light (LPS / SOX)

Simplified Data Sheet — Full specifications for the LPS series are available upon request.

- Lamp Type: Glow Object 55W SOX Low Pressure Sodium
- Application: Residential streets, dark-sky areas, coastal communities, low-glare roadway lighting
- SKU: LPS55WBY22d

Electrical data

Nominal wattage Energy	55 W
Efficiency Label (EEL) Rated	A++
wattage Lamp Current(EM)	56 W
(Nom)	0.51 A
Voltage (Nom)	109 V
Life to 8% Failures(Nom)	6000 h
Life to 30% Failures(Nom)	8000h
Life to 50% Failures(Nom)	12000h

1) At rated voltage and cos ϕ ≥ 0.9

Light technical data

Luminous flux	7800 lm 1)
Luminance	**10 cd/cm²**
Luminous efficacy	**150 lm/W**

1)Valueresultingfromoperating the lamp with a high-reactance transformer

Dimensions & weight

Diameter	53.0 mm
Length	425.0 mm

Why CCT (Color Temperature) Is Not Important for LPS

Traditional lighting comparisons often focus on CCT values such as:
3000K warm white, 4000K neutral white, 5000K cool white

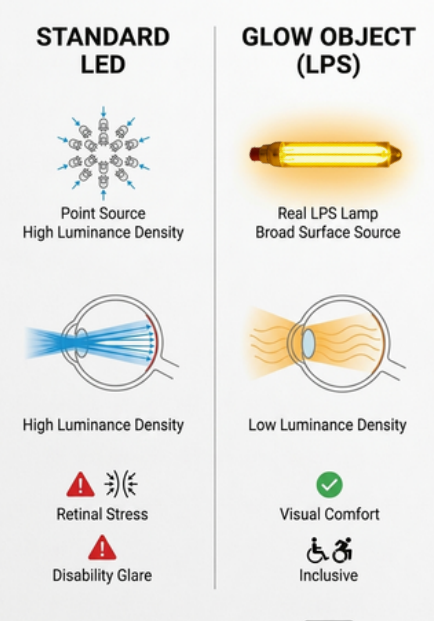
However, Low Pressure Sodium lighting works differently. LPS produces a nearly monochromatic amber spectrum centered around sodium emission wavelengths (~589 nm), with virtually no blue light output. Because of this unique spectral behavior: CCT is not a meaningful performance metric for LPS

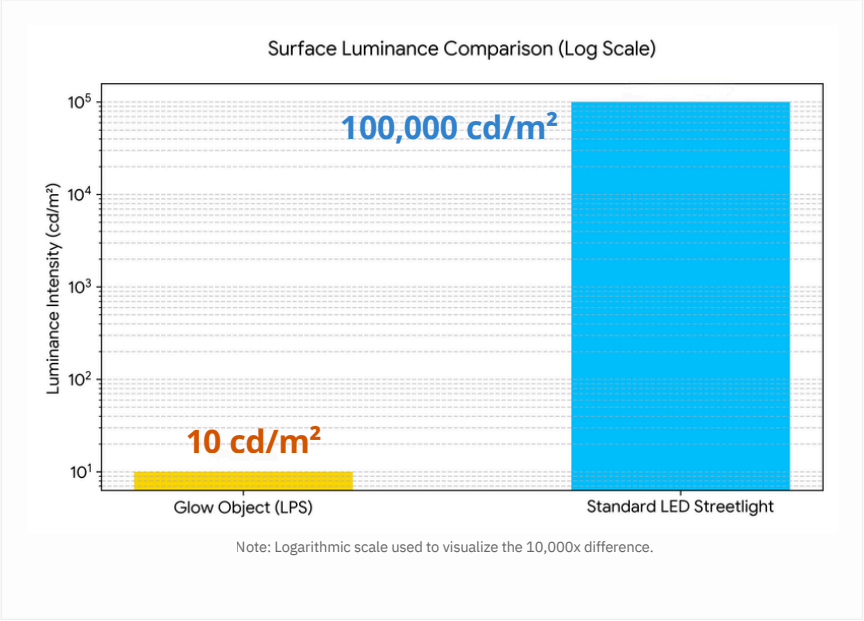
The LPS lamp does not behave like conventional white light sources. Visual comfort and glare reduction are more important evaluation criteria. For roadway and residential applications, the primary benefits come from:

- ultra-low glare,
- minimal atmospheric scattering,
- reduced skyglow,
- and improved nighttime comfort.

Why Luminance Density is Import to Visual Comfort

Luminous Flux (Lumens) measures output, but Luminance (cd/cm^2) dictates perceived intensity. High luminance is the root cause of disability glare and neurological stress.





The Surface Advantage

While standard LEDs concentrate light into tiny, high-pressure point sources, **Glow Object LPS** acts as a broad surface emitter.

LPS Surface Intensity: **10 cd/m^2**
LED Point Intensity: **>100,000 cd/m^2**

This 99.99% reduction in luminance effectively eliminates the "piercing" sensation common in modern LED streetlights.

Human-Centric Impact

Disability Glare: High luminance scatters in the eye, creating a "fog" that obscures vision for the elderly and those with light sensitivity.

Neuro-Inclusion: For neurodivergent individuals, low-luminance environments prevent sensory overload, making urban spaces accessible and safe.

Sources & References:: CIE (International Commission on Illumination), Soft Lights Foundation, American Medical Association, Photobiology Research

Why LPS Can Improve Roadway Safety

> *"Roadway safety is determined not only by how much light is provided, but by how evenly and comfortably it is delivered to the human eye."*

1 MINIMIZING DISABILITY GLARE

The **FHWA** defines disability glare as stray light creating a "veiling luminance," reducing hazard detection. LPS minimizes this physiological interference through low-intensity surface output.

HIGH-INTENSITYLED

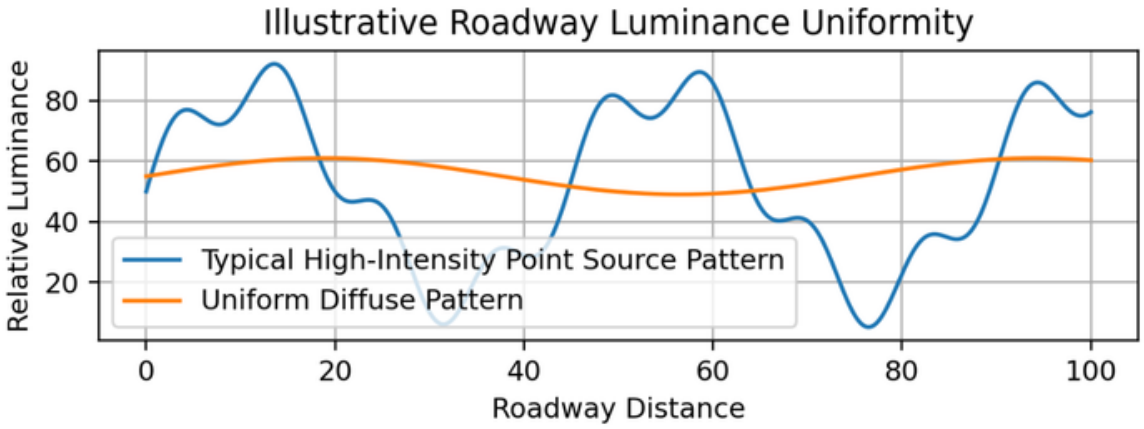
- Concentrated Point-Source Brightness
- Harsh Contrast & High-Angle Glare
- Reduced visual performance (Aged Drivers)

LOW PRESSURE SODIUM (LPS)

- Large Diffuse Arc Tubes
- Low Source Luminance (Surface Light)
- Minimal Veiling Luminance (ANSI/IES RP-8)

2 SUPERIOR SPATIAL UNIFORMITY

Poor uniformity creates the "Zebra Effect"—alternating zones of light and shadow that force constant pupil re-adaptation and increase hazard misses.



3 REDUCING TRANSIENT ADAPTATION

ANSI/IES RP-8 notes that non-uniform sources cause visual fatigue through constant sensitivity adjustment.

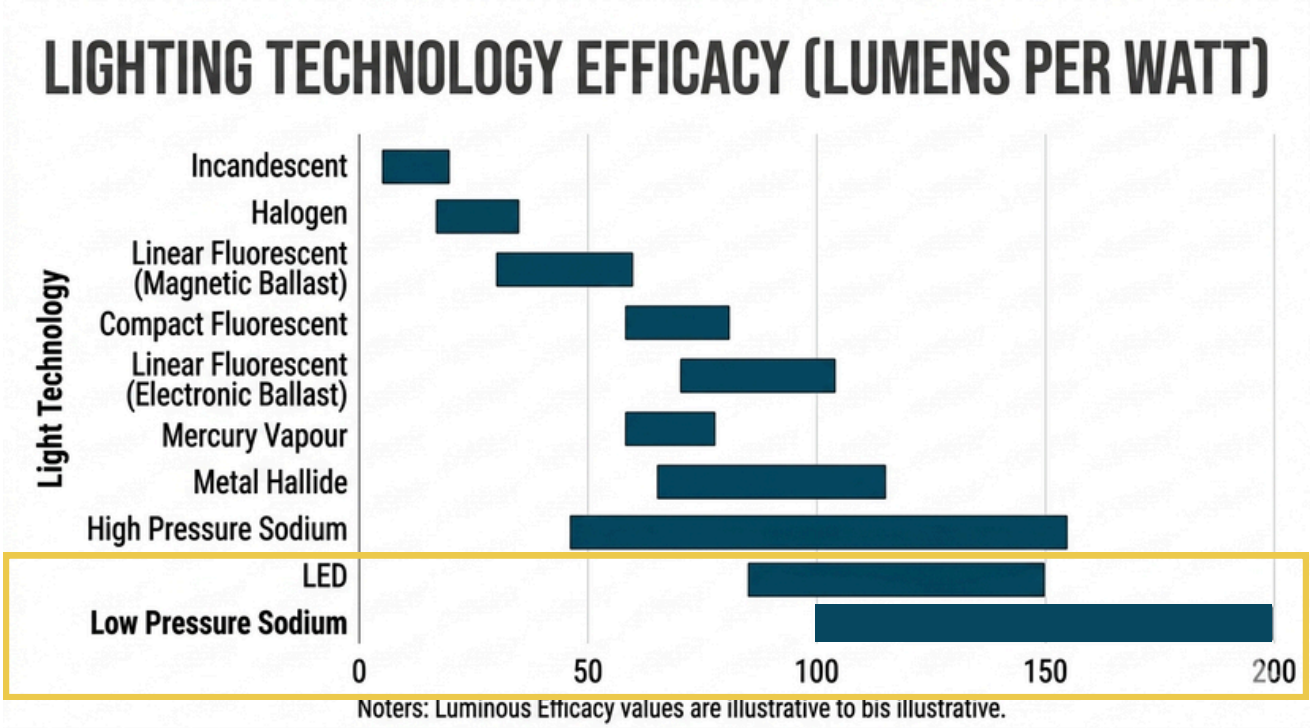
- **Stable Night Vision:** No intense blue-light peaks mean more consistent adaptation.
- **Elder-Friendly:** Reduced glare is critical for aging eyes with slower pupil response.
- **All-Weather Performance:** Monochromatic amber light pierces fog and rain with minimal scattering.

Professional References
- FHWA Roadway Lighting Handbook
- FHWA Visibility and Disability Glare Research
- ANSI/IES RP-8 Roadway Lighting Standard
- Illuminating Engineering Society (IES)

LPS Advantage: LPS produces smooth luminance transitions and lower contrast ratios. By eliminating "Black Holes" between poles, it enhances **Obstacle Detection** and **Pedestrian Visibility** across the entire roadway.

This document discusses visual-performance characteristics and engineering principles only. Roadway safety outcomes depend on fixture design, roadway geometry, installation, maintenance, traffic conditions, and compliance with local standards.

The Gold Standard of Energy Conversion: Why LPS Remains a Leader



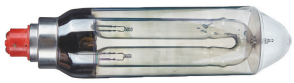
Sources: Compact Flourescent and LED from Energy Star Database 2020. All other lighting technologies from Wikipedia and Google

While modern street lighting is often dominated by LED, Low Pressure Sodium (LPS) remains one of the most energy-efficient lighting technologies ever deployed at scale, reaching up to **200 lm/W**. Because its spectral output closely matches the human eye's peak nighttime sensitivity, it produces a **higher proportion of "useful light"** for roadway visibility **per unit of electricity consumed**. This efficiency directly translates into lower citywide energy demand, which is one of the largest recurring expenses in municipal utility budgets.

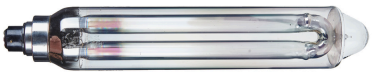
For city governments focused on **long-term infrastructure costs**, this means **fewer kilowatt-hours required** to meet the same or even improved roadway lighting standards, reducing strain on both operating budgets and electrical infrastructure. In addition, the diffuse nature of **LPS lighting reduces glare and visual inefficiency**, allowing roads to be safely illuminated without excessive brightness levels. From a public finance perspective, this combination of high efficacy, reduced peak load demand, and optimized visual performance makes LPS a historically strong benchmark for **minimizing taxpayer-funded lighting costs** at city scale.

PRODUCT FAMILY

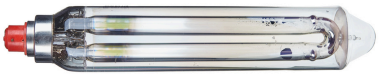
Popular models shown for demonstration purposes only.
Specific models are made to order upon request.



SOX-E 18W
L*D: 216mm*53mm



SOX-E 26W
L*D: 311mm*53mm



SOX-35W
L*D: 311mm*53mm

SOX-E 36W
L*D: 425mm*53mm

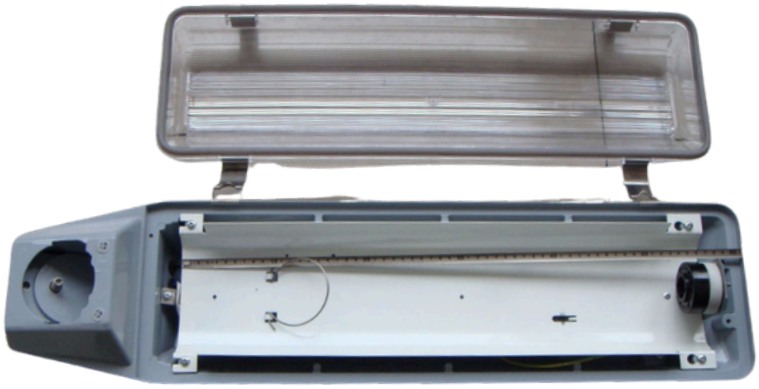
SOX-55W
L*D: 425mm*53mm

SOX-E 61W
L*D: 528mm*66mm

SOX-90W
L*D: 528mm*66mm

SOX-135W
L*D: 775mm*66mm

Ballast
Voltage: 110V-240V
Wattage:Varies by model



Luminaries
Dimensions: Varies by model

ABOUT US

GLOW OBJECT

www.glowobject.com

Overview

Founded in Washington State, Glow Object® is a premier global leader in the research and manufacturing of Low Pressure Sodium (LPS) systems. Our expertise spans high-efficiency lamps, precision ballasts, and mission-critical components. Since our 2023 expansion into the core U.S. market, we have rapidly defined the industry standard for engineering excellence and spectral purity.

Global Scale & Capabilities

With a robust global supply chain, we are capable of delivering over 100,000 units annually to diverse markets across North and South America, Europe, the Middle East, and Oceania. Our infrastructure is built for stability and scalability, ensuring reliable delivery for large-scale municipal and federal contracts.

> Comprehensive Portfolio: Beyond our world-leading LPS technology, we offer a full range of LED, High Pressure Sodium (HPS), and Metal Halide (MH) solutions, tailored for the evolving needs of modern infrastructure.

A Legacy of Trust

Our technologies are deployed within the world's most rigorous environments. Our distinguished clientele includes:

- Federal: NASA, US Navy, US Army
- Commercial: Luxury Hospitality & Communities
- Science: Observatories & Research Institutes
- Creative: Art & Entertainment Industries
- Public: Municipalities & Universities
- Healthcare: Advanced Medical Facilities

Certification & Customization

Glow Object® prioritizes regulatory excellence as an **NDAA Compliant (Section 889 Certified) provider**. Our systems meet the rigorous security and quality benchmarks essential for high-level government and international procurement.

Beyond our standard catalog, we offer bespoke engineering services—delivering custom-tailored lighting solutions backed by comprehensive testing and certification reports to satisfy specific regional and technical requirements.

**Authoritative Evidence & References

1. IARC (WHO) - Monograph Vol. 124

Classifies night shift work and associated light-at-night as Group 2A probable carcinogen due to systemic circadian disruption.

2. Harvard Medical School - Health Publishing

Documents blue light as the most potent melatonin suppressor, linking it to obesity, diabetes, and heart disease.

3. American Migraine Foundation

Identifies specific wavelengths (480 nm) that activate brain pain-sensing cells, triggering migraines and photophobia.

4. Epilepsy Foundation

Confirms high-intensity blue-rich light and flickering as primary environmental triggers for photosensitive seizures.

5. Nature: Molecular Psychiatry Journal

Evidence Shows that artificial light at night induces depressive-like behaviors and alters neural emotional processing.

6. CIE (International Commission on Illumination)

Publication 115:2010, Standard for Glare Evaluation in Road Lighting

7. Soft Lights Foundation

"The Impact of High-Luminance LEDs on Neurodivergent Individuals and ADA Compliance," softlights.org.

8. American Medical Association (AMA)

Report 2-A-16, Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting

9. Photobiology Research

Retinal Illuminance and Pupillary Miosis: A Comparison of Point vs. Surface Sources

Note: These findings highlight that while daytime blue light is beneficial for alertness, night-time exposure represents a significant physiological stressor.

FUTURE CITY

A STRATEGIC BALANCE

The evolution of urban lighting is an exercise in **Strategic Integration**. In our "Future City" vision, a responsible infrastructure is a science-based hybrid of diverse light sources. While modern systems serve various urban needs, we restore **Low Pressure Sodium (LPS)** to residential, ecological, and coastal zones where public health and safety are non-negotiable. By integrating **True Zero-Blue** technology, your administration moves beyond generic hardware toward evidence-based stewardship. We invite you to explore a future where precision engineering respects the rhythm of human life while ensuring full regulatory alignment.

GLOW OBJECT