

The background image shows a modern, eco-friendly classroom or study area. On the left, there is a large vertical living wall covered in green plants. Above it, several small potted plants hang from the ceiling. In the center, a wooden cabinet holds a globe and more plants. To the right, a tall wooden bookshelf is filled with books and plants. In the foreground, there are wooden tables and chairs, some with green mesh backs. A small rug with two green pillows is on the floor. A window with blinds is visible on the far right. The overall theme is sustainability and green design.

Beyond Energy Savings

Green California Summit 2026

How School Lighting Modernization Projects
Deliver Long-Term Sustainability Benefits

Meet the Panel

Two perspectives on one project — from development and financing through lighting design, construction and the broader sustainability benefits.



Thomas Wray

LTS Property Services

Lighting Implementation & Contractor
Perspective

● Contractor



Dominic Cardenas

Southland Industries

Project Development & ESCO
Perspective

● ESCO

What You'll Learn

Four practical takeaways from project development through construction and long-term value.

1

Structure & Funding

How comprehensive school modernization projects can be structured and funded

2

From Audit to Installation

How the PUSD lighting modernization moved through design, installation and controls

3

Value Beyond Energy

Maintenance, infrastructure, material reuse and the learning environment

4

Transferable Lessons

Practical lessons other school districts can apply to future modernization projects

Pomona USD / Program Overview

Pomona Unified School District undertook a multi-site infrastructure and energy modernization program with Southland Industries. Lighting modernization was a significant component across numerous district facilities.

Multi-Site

District-wide program

Integrated

Energy & facility improvements

Site-Specific

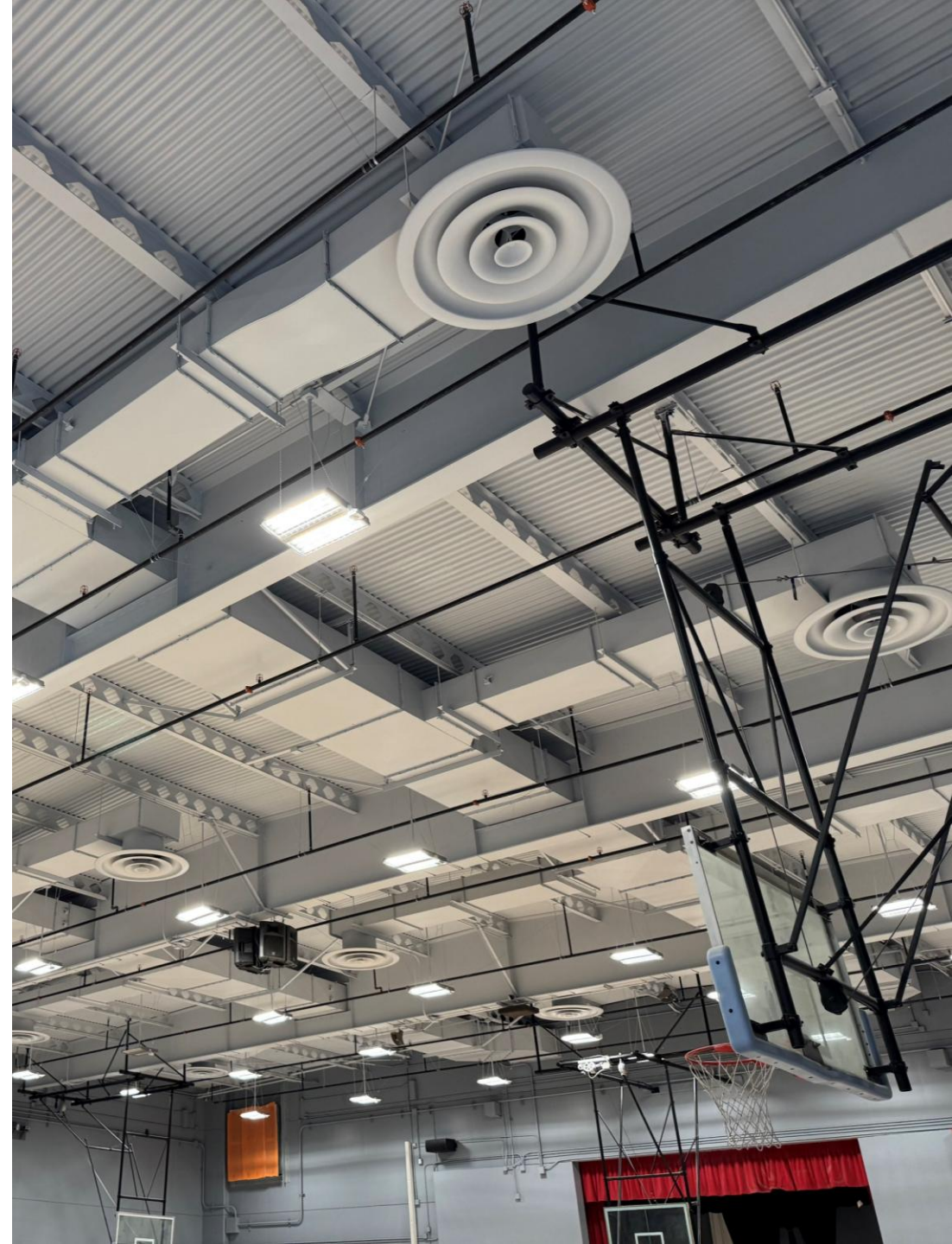
Solutions by application

Program-level scope, financing and overall savings to be detailed by Southland.

The District's Challenges

Southland has been working with the District for more than a decade, beginning with HVAC maintenance and expanding to District-wide energy efficiency and infrastructure improvements

- Aging buildings, aging equipment
- Large CIP list, not enough bond funding to address every need
- Limited facilities staff with a limited O&M budget; lots of schools to maintain
- Lack of visibility into how and when equipment is operating





Why a Comprehensive Approach?

The District's facility improvement needs aligned with the benefits of taking a comprehensive approach

- The same widespread needs across the District
- Standard design-bid-build process can be costly and burdensome
- One programmatic approach can simplify the process, reduce the project timeline, and cost
- Improved consistency and quality of delivery

Project Scope – Big Picture

The project touched mechanical, electrical, lighting, and building envelope systems — each measure strengthening the overall financial and sustainability case.



Lighting Modernization

- Classrooms & corridors
- Gymnasiums
- Exterior areas



Controls & Automation

- Occupancy sensors
- Daylight harvesting
- BAS integration



Mechanical & HVAC

- HVAC upgrades
- Energy conservation
- Building envelope



Multi-Site Coordination

- Multiple school sites
- Multi-year contracts
- Phased delivery

Project Scope – Site Summary

The overall scope at a glance:

School	Lighting Retrofit	HVAC Replacement	HVAC Controls
Garey High School		✓	✓
Diamond Ranch High School	✓	✓	✓
Pomona High School		✓	✓
Ganesha High School	✓	✓	✓
Simons Middle School	✓	✓	✓
Fremont Academy of Engineering & Design		✓	✓
Lorbeer Middle School	✓		
Lopez Elementary	✓		
Emerson Middle School	✓	✓	✓
Alcott Elementary	✓	✓	✓
Arroyo Elementary	✓	✓	✓
Marshall Middle School	✓	✓	✓
Armstrong Elementary	✓	✓	✓
Kingsley Elementary	✓	✓	✓
Philadelphia Elementary	✓	✓	✓
Madison Elementary	✓	✓	✓
Lexington Elementary	✓	✓	✓
Golden Springs Elementary	✓		
Harrison Elementary	✓	✓	✓
Barfield Elementary	✓	✓	✓
Allison Elementary	✓	✓	✓
Kellogg Polytechnic Elementary	✓	✓	✓
San Jose Elementary	✓		
Alcott Annex	✓		

Replace vs. Retrofit — A Site-Specific Approach

The objective wasn't to replace everything. It was to use the right solution for each application.

RETAIN

Keep usable infrastructure

Existing housings and electrical infrastructure remained in service where condition and application supported reuse.

RETROFIT

Modernize viable fixtures

LED retrofit kits upgraded many existing fluorescent fixtures while avoiding unnecessary full-fixture replacement.

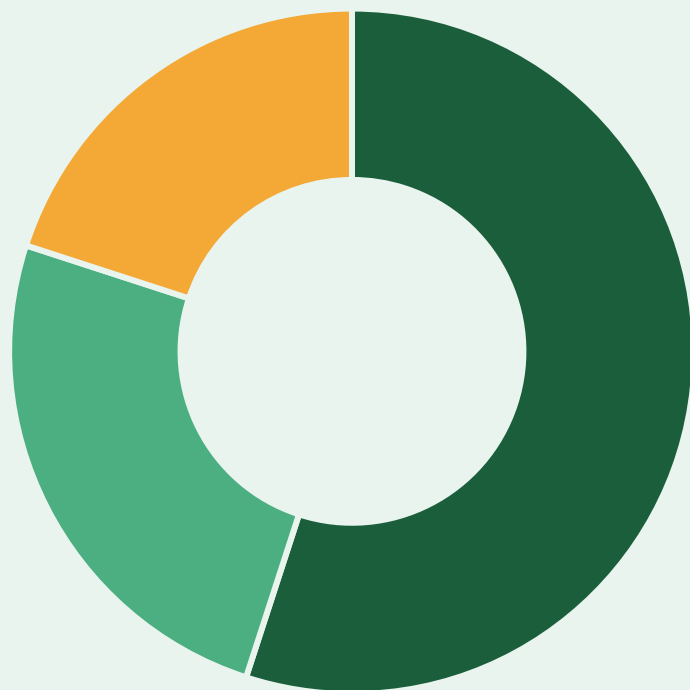
REPLACE

Install new luminaires where needed

New LED luminaires were used where fixture condition, performance, configuration or application called for replacement.

Then add appropriate controls — occupancy, dimming, daylight response and scheduling — where they provide additional value.

Relative Energy Savings by Measure Category



▪ LED Lighting Retrofit ▪ Controls & Scheduling ▪ HVAC & Other Measures

Where the Savings Came From

Lighting contributed the largest single share of energy savings, and its interaction with controls and scheduling amplified the return across the entire project.

- **Lighting retrofit** — largest energy reduction measure in the bundle
- **Occupancy & daylight-responsive controls** added 30–50% additional savings beyond fixture replacement alone
- **HVAC and other measures** contributed incremental savings that improved overall project payback
- Combined measures moved the project from **marginal to clearly financeable**

Lighting – Existing Conditions

Existing lighting varied by school and application, with a mix of legacy fluorescent, HID and other lighting systems providing significant opportunities for modernization.

▲ Fixture Types

Fluorescent T8/T12 and HID sources throughout campus buildings

💡 Lamp & Ballast Maintenance

Legacy fluorescent lamps and ballasts required ongoing replacement and maintenance

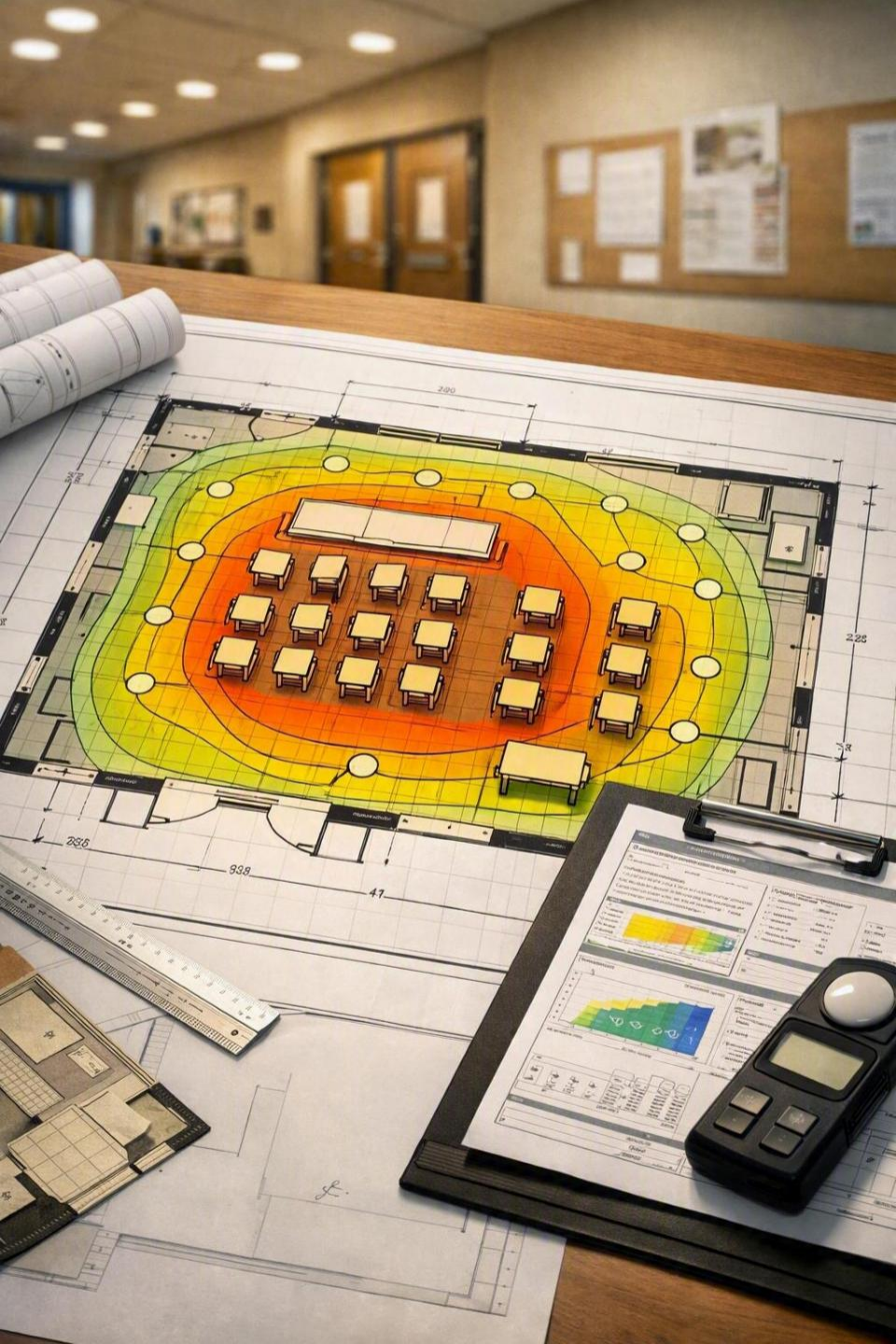
👁️ Control Opportunities

Legacy controls provided opportunities for occupancy sensing, daylight response, and scheduling

👤 Exterior Fixtures

Legacy HID exterior fixtures provided opportunities for LED conversion and controls





Lighting Audit & Design Approach

A thorough fixture-by-fixture audit formed the foundation for a design that balanced code compliance, energy performance, and occupant comfort.

- **Room-by-room inventory** — fixture types, quantities, wattages, and condition documented across all campus buildings
- **Photometric analysis** — existing foot-candle levels measured and benchmarked against IES standards
- **Code & controls strategy** — Title 24 requirements were evaluated with the customer, including lighting controls, demand-response capability, and future system scalability.
- **Fixture selection criteria** — lumen output, CCT, CRI, efficacy (lumens per watt), and warranty life
- **Retrofit vs. replacement** — Existing fixture condition and application were evaluated to determine where retrofit/relight kits or complete new luminaires provided the best solution.

LED Solutions by Application

SPACE / APPLICATION	TYPICAL LED SOLUTION
Classrooms & Offices	LED retrofit/relight kits in existing fluorescent housings; new luminaires where appropriate
Corridors & Common Areas	Retrofit kits or new LED luminaires based on existing fixture type and condition
Restrooms & Utility Areas	LED wraps, strips, retrofit kits or new fixtures depending on the application
Gymnasiums / Large Spaces	New LED high-bay luminaires replacing legacy high-wattage lighting
Exterior Areas	New LED area lights, wall packs, canopy fixtures and other application-specific luminaires
Specialty Applications	LED downlights and other specialty solutions selected for the specific application

Retrofit where practical. Replace where needed. Match the solution to the application.



Lighting Controls Strategy

Wireless controls provided occupancy sensing, daylight response, dimming and local control while maintaining flexibility for future system expansion.



nLight AIR Wireless Controls

Wireless wall switches/dimmers, ceiling sensors and compatible luminaires provided room-level control without requiring a new control wiring network.



Controls Matched to the Application

Occupancy sensing, daylight response, dimming, photocells and scheduling were applied where appropriate rather than using one control strategy everywhere.



Scalable Architecture

The system can operate at the room level today while providing a path to add system-level controllers and expanded network functionality in the future.



TITLE 24 DESIGN CONSIDERATION

Demand-response capability was discussed with the District. The selected architecture preserves a path to expanded demand-response functionality without requiring replacement of the field lighting controls.

California Code & Regulatory Considerations

Lighting modernization in California is shaped not only by energy savings, but also by evolving energy-code requirements and product regulations.

TITLE 24 — CALIFORNIA ENERGY CODE

Lighting alterations can trigger requirements for lighting power and controls, including automatic shutoff, occupancy sensing, daylight response, outdoor controls and demand-response capability depending on the project scope and application.

CALIFORNIA FLUORESCENT LAMP PHASE-OUT

California's phase-out of most general-purpose fluorescent lamps (Assembly Bill 2208) is accelerating the move away from legacy fluorescent systems. For school districts, long-term lamp availability and maintenance become additional reasons to plan LED modernization rather than simply replace failed lamps.



Installation & Phasing

Working in an operating school district required a phasing plan that kept students and staff safe while maintaining construction momentum across multiple sites.

- **Academic calendar sequencing** — Major work in summer and school breaks to minimize disruption
- **Room-by-room phasing** — Building-by-building approach to minimize classroom displacement
- **Administrative coordination** — Access scheduling and communication to school administrators and staff
- **Night & weekend work** — Deployed where summer schedule alone was insufficient to meet milestones
- **Safety protocols** — Elevated work procedures for spaces above or adjacent to occupied areas





Commissioning & Verification

Commissioning confirmed the system performed as designed – a critical step for meeting savings and performance requirements, triggering utility rebates, and validating the ESCO performance guarantee.



- Functional acceptance testing of every occupancy sensor and daylight zone
- Measured foot-candle verification against design targets and IES standards
- Controls programming verification — schedules, setpoints, fail-safe modes
- Utility rebate inspection and metered baseline documentation

Where Lighting Energy Savings Came From

LEDs reduced connected load first. Controls reduced operating hours where appropriate – together producing substantial energy savings across school applications.

APPLICATION	LED + CONTROLS	TYPICAL ENERGY REDUCTION
Classrooms	LED retrofit + occupancy/daylight controls	60–80%
Offices	LED retrofit + occupancy controls	65–80%
Corridors / Common Areas	LED + occupancy controls	50–75%
Restrooms	LED + occupancy controls	55–80%
MPR / Cafeteria	LED + application-specific controls	50–65%
Exterior / Parking	LED conversion + exterior controls	45–80%

Representative ranges from project proposals; actual savings varied by existing fixture type, application and control strategy.

LOWER WATTAGE + FEWER OPERATING HOURS = TOTAL LIGHTING ENERGY SAVINGS

Many controlled interior spaces were modeled with approximately 20% fewer lighting operating hours.

Beyond Energy Savings



Infrastructure



Maintenance



Learning



Sustainability



Workforce

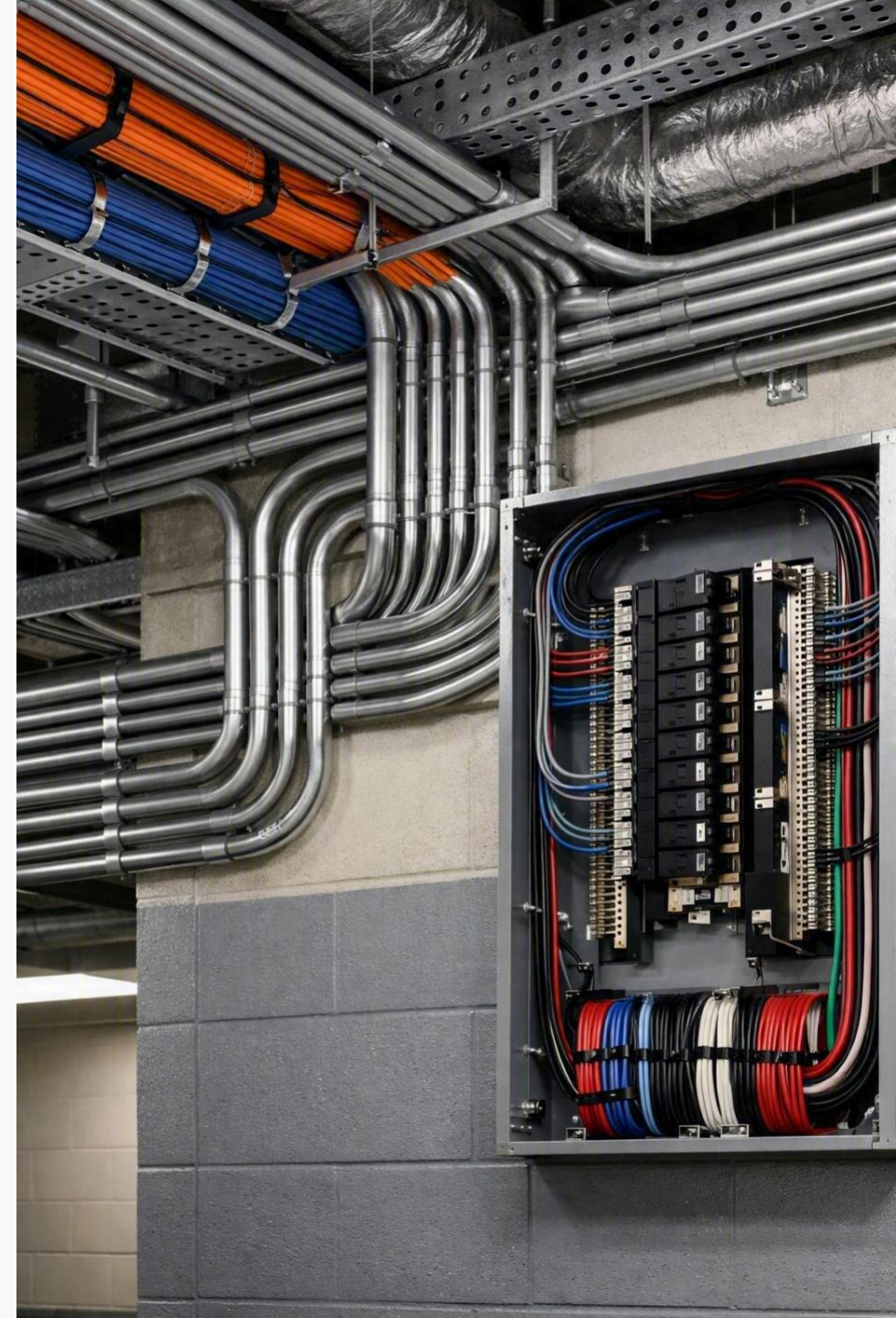
Renewing the Lighting Infrastructure

The project did more than reduce energy use — it effectively replaced an aging lighting system with a modern system designed to provide decades of service.

- **Renewed lighting infrastructure** — Legacy fluorescent, HID and other aging lighting systems were comprehensively modernized with new LED lighting technology and controls.
- **Resetting the lifecycle clock** — Whether through new luminaires or LED retrofit systems, the operating components are now new — creating a new long-term lifecycle for the District's lighting infrastructure.
- **Eliminating deferred lighting maintenance** — Instead of continuing to repair and maintain aging lighting equipment, the project addressed the District's existing lighting needs as part of the modernization program.
- **Long-term infrastructure value** — The District now has a modern lighting platform intended to serve its facilities for many years rather than an aging system requiring continued reinvestment.



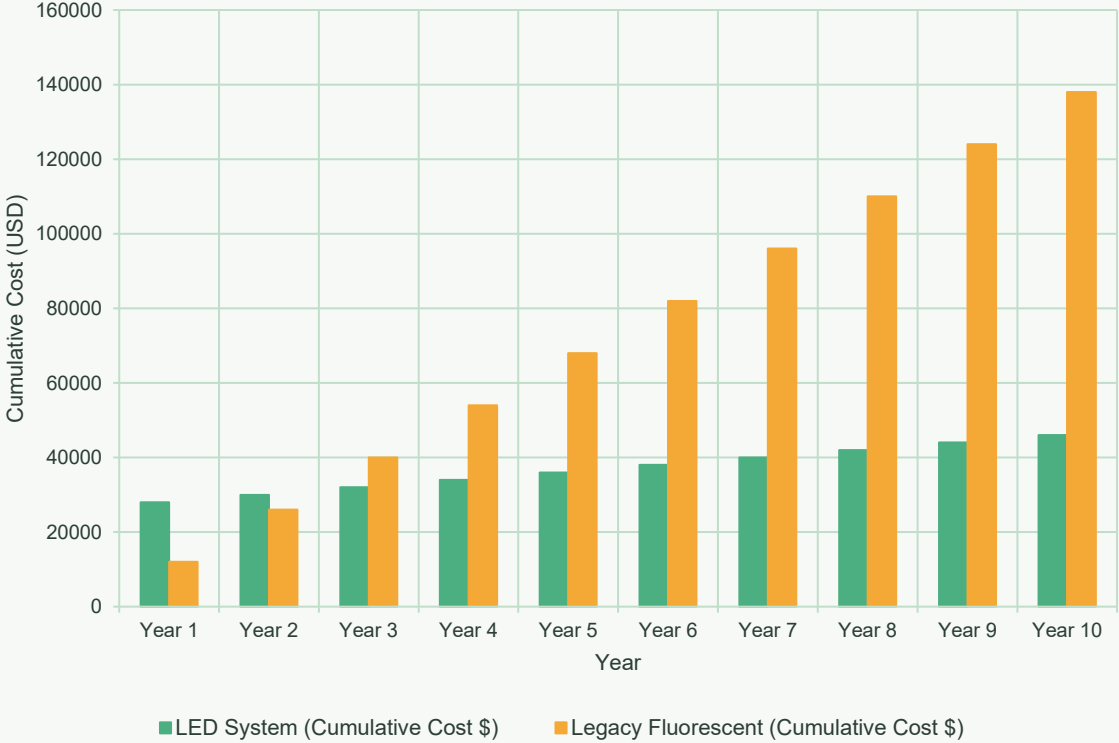
Energy savings are only part of the return — the project also renewed a major piece of the District's facility infrastructure.



Maintenance & Lifecycle Benefits

Modern LED lighting significantly extends service intervals, reducing routine maintenance demands and the ongoing cost of maintaining legacy lighting systems.

- **Longer service life** — LED rated service life: 50,000–150,000 hours vs. approximately 8,000–24,000 hours for traditional fluorescent lamps.
- **Fewer components to maintain** — LED systems eliminate the recurring lamp-and-ballast replacement cycle associated with traditional fluorescent lighting.
- **Reduced parts inventory** — Less need to stock multiple fluorescent lamp types, ballasts and other legacy replacement components.
- **Fewer lighting service calls** — Longer service life means fewer failures, fewer work orders and less labor devoted to routine lighting maintenance.
- **Simplified long-term maintenance** — Standardizing around modern LED fixture and retrofit families makes future maintenance, replacement and sourcing easier for District facilities staff.



Fewer components • Fewer failures • Longer service intervals

Circular Economy in Lighting: The TM66 Framework

TM66 applies circular-economy principles to lighting by extending product life, retaining useful materials and reducing waste.

WHAT IS TM66?

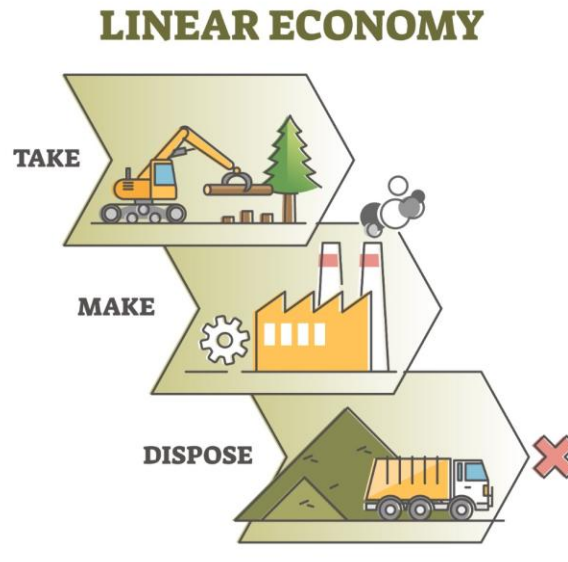
A technical framework developed by the UK's CIBSE and Society of Light and Lighting for applying circular-economy principles to lighting.

DESIGN FOR LONGER LIFE

Maintain, repair, upgrade or adapt lighting products rather than automatically replacing them. Retain useful products and components before recycling or disposal.

HOW THIS PROJECT APPLIES THE PRINCIPLE

TM66 was not a Pomona USD requirement, but the project's retrofit and relight approach follows the same principle: keep what still has value and replace only what is necessary.



CIRCULAR-ECONOMY REGULATION IS EXPANDING

California's SB 54 requires producers to reduce packaging waste and improve recyclability. It does not directly regulate lighting products, but it indicates where future product and packaging requirements are heading.

Beyond the Fixture: Packaging & Transportation

Circular-economy thinking also asks how much material comes to the jobsite — and how efficiently products are packaged and transported.



Example: multiple lighting products shipped together on a palletized system with limited individual packaging.

REDUCE PACKAGING AT THE SOURCE

Use project-oriented or bulk packaging where practical instead of individually boxing every fixture or component.

SHIP LESS EMPTY SPACE

Denser pallet configurations can reduce cardboard, pallets and truck space required to move the same amount of product.

KEEP MATERIALS SIMPLE

Corrugated cardboard and other readily recyclable materials make jobsite recovery easier than complex mixed-material packaging.

The best package may be the one you never use.

Retrofit vs. Replace: The Material Impact

Acuity / reLight illustrative case study: relighting 227 2×4 troffers instead of removing and replacing the complete fixtures dramatically reduced material leaving the site.

>70%

LESS SCRAP WEIGHT

Replace: 3,859 lb (1.93 tons)

Relight: 1,135 lb (0.57 tons)

>77%

LESS SCRAP VOLUME

Replace: 499.4 cu ft

Relight: 113.5 cu ft

>78%

FEWER SCRAP PALLETS

Replace: 9 pallets

Relight: 2 pallets



Less material to handle, haul and dispose of.

Retaining the housing avoids creating waste in the first place — recycling is the next step, not the first.

Visual Comfort Indoors

Inside the classroom, visual comfort is the sum of uniformity, glare control, color quality, and flicker-free light – the qualities students and teachers notice every day.

- **Uniform light** across desks and whiteboards
- **CRI ≥ 90**
- **4000K neutral white** supports alertness
- **Flicker-free drivers** reduce eye strain
- **Dimming** for projection and quiet work
- Teacher and student feedback: **spaces feel more professional and conducive to learning**

Glare Control

- New LED lighting can make glare worse
- Low-glare optics were specified: diffusers, shielding and controlled light distribution
- Uniform Glare Rating (UGR) <20 is a commonly used benchmark for classrooms



Visual Comfort Outdoors

Outside, comfort means seeing safely after dark — even illumination on paths and parking areas, with glare and light trespass kept in check.

-
- **Full-cutoff optics** aim light down, not into eyes
 - **Even walkways** — no bright spots and shadows
 - **Instant-on LED** — no HID restrike delay
 - **Safer lots and entries** after dark
 - **Less light trespass** and uplight
 - **Photocells and schedules** hold savings

BUG Ratings! (**B**acklight, **U**plight, **G**lare)



Education & Workforce Opportunities

The project created a platform to connect students with the skilled trades and construction careers — turning a facility upgrade into a workforce development opportunity.

- Students observed real project work — electricians, project managers, commissioning technicians
- Conversations about pathways into the trades: apprenticeships, union programs, STEM connections
- Construction-phase site visits connected classroom learning to real-world application
- Local hire and prevailing wage requirements supported regional workforce development
- San Gabriel Valley NGO partnership explored to extend community workforce reach



Long-Term Operational Benefits

The cumulative operational improvements — lower energy cost, less maintenance, better infrastructure, and smarter controls — transform the district's facilities profile for a decade or more.



Year 1
Immediate Savings

Year 1 Energy Savings & Stability

- Predictable energy costs through performance contract savings guarantee
- Modern, monitored systems enable data-driven facilities management from day one
- Utility rebates and savings begin offsetting project financing immediately



Year 5
Maintenance Reduction

Year 5 Maintenance Dividend

- Reduced facilities staff workload frees resources for student-facing priorities
- Lamp and ballast replacement programs largely eliminated across all sites
- Improved facility condition strengthens property valuation and community confidence



Year 10+
Infrastructure Readiness

Year 10+ Infrastructure Platform

- Foundation established for future smart-building and electrification investments
- Improved bond capacity and district credibility for next capital program
- Addressable controls infrastructure ready for grid-responsive and demand-response programs

Five Things Other School Districts Can Take Away

These five principles are directly transferable – any district contemplating a lighting modernization can act on them today.



Bundle Measures

Lighting alone rarely pencils; add controls, HVAC, and envelope for a financeable project.



Use ESCO Performance Contracting

It shifts risk, provides financing, and guarantees results – without burdening the general fund.



Plan for the School Calendar

Summer windows are short; phasing must be built into the contract from day one.



Commission Controls, Not Just Fixtures

That is where the additional 15–40% of savings lives – sensors and schedules make or break desired outcomes.



Frame Sustainability Beyond kWh

Infrastructure renewal, maintenance savings, and circular economy benefits strengthen the project case with boards and communities.

Questions?

The panel welcomes questions from the audience.



Thomas Wray

LTS Property Services

Business Development

twray@ltspropertyservices.net

714.402.9316



Dominic Cardenas

Southland Industries

ESCO & Project Development

Dcardenas@southlandind.com

530.204.8381