

Minnesota Schools Evaluate PoE Network Lighting to Meet Their Lighting Needs.

For the PoE demonstration project, two public school systems, Edina Independent School District (ISD) 273 and Atwater Cosmos Grove City (ACGC) ISD 2396, installed PoE systems during renovations on select schools.

- In the summer of 2018 during a school-wide renovation at Edina's South View Middle School (SVMS), a classroom was selected to have a PoE network lighting system installed with luminaire-level lighting control. An identical adjacent classroom had line voltage LED lights installed and would serve as a control for comparison. These lights were not networked and were controlled by a single wall switch. The PoE classroom had 16 PoE 2x2 troffers installed while the control classroom was lit by 12 AC-powered 2x4 troffers, delivering equivalent light
- During the summer of 2020, both the ACGC Elementary and Junior/Senior High Schools underwent major remodeling. A PoE networked lighting system was installed in the Admin Offices of the Jr/Sr HS and a line voltage DALI (Digital Addressable Lighting Interface) network lighting system was installed in the Elementary School Admin Offices.

Igor PoE lighting systems were installed in the two PoE lit spaces, which were composed of PoE switches, Igor Nodes, LED luminaires, occupancy/photosensors, and wall controls.

Comparisons

The performance of the PoE networked lighting systems can be compare to three different base cases:

- The legacy T8 fluorescent lighting.
- Non-networked line voltage LED lights.
- Networked line voltage DALI lighting system.

The PoE lighting system uses the same LED lamps as the line voltage systems but the lamps are powered directly by low voltage DC electricity from PoE network switches in the local area network. Igor Energy nodes distribute the power and provide network control to the lamps, sensors, and wall switches via their lighting server and management system.



Edina, MN's South View Middle School classroom uses PoE lighting.

“Our contractor was able to install both an AC Powered DALI and PoE system simultaneously, and they learned that the PoE lighting system would be the easier (and less expensive) route if they had the knowledge and experience prior to bidding.”

— Nathan Wriedt, PE, RCDD, Electrical Project Manager for LHB, Inc.



PoE lights in the Admin Office of the ACGC Junior/Senior High School.

Major Findings

The table below shows the results obtained from monitoring the four spaces in the schools.

Energy Savings: As would be expected, LED lamps provide significant energy savings over T8 fluorescent lamps. The PoE lighting system provides luminaire level lighting control so energy savings over analogous line voltage LED lights will depend on operation of individual LED lamps by varying brightness and color temperature, if applicable.

Standby/Baseload Power: The benefits of the intelligence, control, and management of the PoE system comes with an energy penalty of the network devices, sensors, and controls that are required. This continuous power load will compare unfavorably to a non-networked line voltage lighting system but will be comparable to a similar AC-powered DALI lighting system.

Building System Integration: At the SVMS the PoE lighting system was integrated with the school security system to allow the classroom lights to signal threat alarms. The PoE occupancy sensors were also integrated with the school BAS using BACnet to allow occupancy control of the room's HVAC system.

System Costs: During the beginning of this project, the newness of PoE lighting systems resulted in bids that exceeded projections because contractors often applied high voltage electrician rates, higher costs of specialty luminaires, and inexperience with the

technology. With time and familiarity with the low voltage system, bids were in line with expectations. Bids for the PoE projects should have equivalent or cheaper costs than the similar line voltage-specified network lighting system job.

Tips and Best Practices

- ▶ Greater communication between IT and facilities is necessary since IT will have increased responsibility over the operation and maintenance of the networked lighting system.
- ▶ Specify Division 27 - Communications for PoE systems for bids to ensure that the electrician rates for low-voltage DC-power are used.
- ▶ Make use of the network switch management software for real time port level energy monitoring (and the PoE devices connected to each network switch port).
- ▶ Midspan injectors with non-PoE network switches can be considered to power the PoE devices for some cost savings but will restrict the ability to monitor the power at the port level energy use.
- ▶ Look for opportunities to integrate the networked PoE system with other networked building systems to increase sensing, control, and functionality.
- ▶ Consider using constant voltage PoE lighting system to increase compatibility with other DC-equipment and allow the ability to daisy chain lights and reduce the number of energy nodes needed.

Project Results				
Location	Edina South View Middle School		ACGC School District	
Site	Classroom 1	Classroom 2	Jr-Sr High School Admin Offices	Elementary School Admin Offices
Lighting System	PoE lighting system	AC LED lighting	PoE lighting system	DALI system
Fixtures	16 – 2x2 troffers	12 – 2x4 troffers	59 – 2x2 troffers 22 – 4' linear lights 1 – 4" downlights	15 – 2x2 troffers 5 – 2' linear lights 1 – 4" downlights
Power Draw	469 W	368 W	1687 W	1000 W
Power/Fixture	29 W	30 W	21 W	48 W
Baseload	49 W	3 W	348 W	60 W
Baseload/fixture	3.1 W	0.3 W	4.2 W	2.9 W