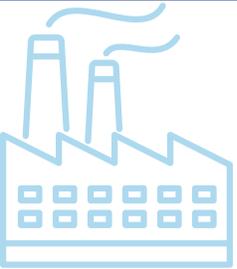


AIG NONRESIDENTIAL NEIs CASE STUDY RESULTS



MANUFACTURING/ INDUSTRIAL



LED LIGHTING

Customers said upgrading to LEDs increased overall lighting quality and brightness, resulting in improved facility safety, product quality, and worker happiness, as well as decreased administration, waste disposal, and maintenance costs associated with replacing burned-out bulbs.

OPERATIONS AND MAINTENANCE

- Participants commonly reported decreased administration costs associated with ordering new bulbs and changing out old ones. Cost savings ranged between \$200 and \$2,145 annually.
- One process manufacturer said they went from a dozen bulb replacements per week in office settings to none.

WORKSPACE COMFORT

- Participants frequently noted increased positivity in the workspace and said the LED lighting was brighter and more natural. One participant said they originally completed the project primarily for the energy savings, but the improvements in worker attitudes and feeling in the space were the most valuable changes.

"Workers feel like the owner is investing in their space."

VISIBILITY

- An industrial pipe manufacturer said they catch 15%–20% more product defects, potentially saving thousands of dollars in sales and product replacement since upgrading to LEDs. They also said increased exterior lighting quality and visibility resulted in a 10% reduction in product damages in the yard.
- A truck body manufacturer shared employees can see better to weld, resulting in fewer errors and saved worker time.

"Good lighting means you can see what you're working with much better. So, if you want to assess quality out on the floor, if you've got good lighting, you now can assess the quality of the product that you're producing more easily."

REDUCED DOWNTIME

- A truck body manufacturer reported saving \$500,000 in avoided annual facility downtime costs. Before their upgrade a bump in power meant they had to wait for the metal halides to cool before re-igniting, causing a halt in production.
- A construction aggregate producer said the LEDs do not require the 30 minutes of warm-up that their old fixtures required, resulting in approximately \$3,400 in annual labor savings.

SAFETY

- Participants said the lighting upgrade improved exterior facility safety due to increased brightness and bulbs burning out less frequently.

"By eliminating the glass lenses in the fixtures or the light tubes themselves, I've improved the plant safety from a food safety standpoint and a personnel safety standpoint, because no one's going to get hurt by the cut glass or anything like that."



COMPRESSED AIR

OPERATIONS AND MAINTENANCE

- A truck body manufacturer reported reduced administration costs associated with ordering replacement parts, valued at approximately \$1,200 per year.

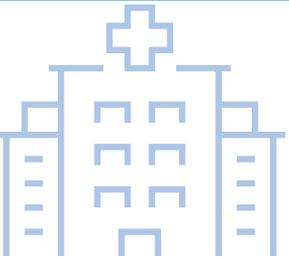
"The longevity of the machines [is improved], because we can cycle now between the three instead of having all three run all the time; we can run two at a time and save on another machine."

OPERATIONS AND MAINTENANCE COST SAVINGS

Measure	Average Incentive Amount	Value of Average Annual Energy Savings	Value of Average Annual O&M Impacts	Payback Period (Years)*
LED Fixture	\$30	\$32	\$12	1.20
Efficient Air Compressor	\$3,125	\$2,463	\$460	0.93
VFD on 20 HP Chilled Water Pump	\$2,447	\$475	\$157	1.01
VFD on 15 HP HVAC Supply/Return Fan	\$1,875	\$2,344	\$10	0.63
VFD on 25 HP HVAC Supply/Return Fan	\$3,125	\$13,671	\$85	0.09
VFD on 40 HP HVAC Process Fan	\$5,000	\$6,119	\$382	1.88
VFD on 40 HP HVAC Process Pump	\$5,000	\$3,888	\$282	0.71

*Includes value of incentive, energy savings, and O&M non-energy impacts (NEIs)

AIG NONRESIDENTIAL NEIs CASE STUDY RESULTS



HEALTH CARE



HVAC

Participants stated the value of non-energy benefits from their HVAC projects, including increased patient comfort and consistent temperature, were more valuable than the energy savings.

FACILITY COMFORT

- Participants reported tenant calls due to discomfort decreased from 1–10 calls a week to almost none, resulting in \$8,000–\$12,000 annual savings in maintenance staff time.

“So now that we’ve got a reliable boiler, the occupants are happy, the temperature is consistent, within standards.”

- One participant said installing VFDs on HVAC motors resulted in a 50% increase in patient comfort. The ability to run the fan at different speeds eliminated the need for maintenance to manually flip the breakers each morning, saving approximately \$1,000 in annual labor savings. Another said tenants no longer feel the “rush of air” coming and stopping.

“We’re not having to go upstairs and mess with the fan coil units, because they’re actually running all the time now.”



LIGHTING

OPERATIONS AND MAINTENANCE

- Participants emphasized the improvements in lighting quality and patient comfort. One said their new lights do not flicker, are brighter, and are more like daylight.

“I think [the LED lighting] helps with worker productivity and I feel that it helps even with our visitors or patients that come into the hospital, that they just feel better.”

“I like the fact of going into a mechanical room or workspaces around the hospital and feel a lot more positive about working in the space, just because I can see what I’m doing better.”

OPERATIONS AND MAINTENANCE COSTS

- Participants reported reduced staff time spent checking for burnt out bulbs, ordering new bulbs, installing new bulbs, and disposing of old ones, resulting in approximately \$14,000 in annual labor savings.

“And now my staff are not getting work orders on a routine basis to come in here and change out any of these bulbs or change anything else. Fixtures in and done. So, it’s a ton of operational savings for our maintenance team. There’s no doubt.”

FACILITY SAFETY

- Customers reported improved facility safety in parking lots and mechanical spaces due to increased brightness. One respondent said third-shift employees feel more comfortable getting out of their car at night in a brightly lit parking lot.

“The [lighting] quality is up tremendously. Especially in the exterior, you get a lot brighter lumen, so it creates a feeling of safety for patient or people walking through the parking lot, things like that.”

“I think it gives a good image on the hospital to come into a brightly lit facility for security and comfort. It gives everyone, employees and visitors to the hospital, a safe sense, you know, when they come onto our property.”

OPERATIONS AND MAINTENANCE COST SAVINGS

Measure	Average Incentive Amount	Value of Average Annual Energy Savings	Value of Average Annual O&M Impacts	Payback Period (Years)*
LED Fixture	\$30	\$57	\$12	0.75
Efficient Air Compressor	\$3,125	\$2,463	\$460	0.93
VFD on 10 HP Hot Water Pump	\$1,250	\$1,418	\$34	0.46
VFD on 10 HP Chilled Water Pump	\$1,250	\$527	\$28	1.22
VFD on 20 HP Chilled Water Pump	\$2,447	\$1,055	\$157	0.52
VFD on 25 HP HVAC Supply/Return Fan (Roof Mounted)	\$3,125	\$9,101	\$85	0.14
VFD on 15 HP HVAC Supply/Return Fan (Roof Mounted)	\$1,875	\$1,561	\$10	0.96

*Includes value of incentive, energy savings, and O&M non-energy impacts (NEIs)

AIG NONRESIDENTIAL NEIs CASE STUDY RESULTS



RETAIL



HVAC COMFORT

- Autobody shop participant reported improved store comfort led customers to spend 10% more time in store, corresponding to a \$6,000 increase in annual sales.
- Autobody shop participant said the combined impact of increased lighting quality and store comfort resulted in an increase of 10% in annual walk-in sales
- Participant said improved comfort means staff are 20% more productive, a value of \$8,000 per worker annually.
- Participant said installing advanced thermostats saved staff 10 minutes a day by automating thermostat adjustments.

"Better lighting made it easier to see and the HVAC system made it cooler and more comfortable to work."



LIGHTING

Autobody shop participant said increased brightness improved product display and color and that the lighting quality improvements alone were worth the cost of the upgrade.

COMFORT

- Participant said after their lighting upgrade the lights no longer produced humming sounds.

PRODUCT DISPLAY

- Switching from T5s to LEDs improved store brightness and product display.

"The best thing done was the lighting. It just improved everything in here by 50%."

OPERATIONS AND MAINTENANCE COST SAVINGS

Measure	Average Incentive Amount	Value of Average Annual Energy Savings	Value of Average Annual O&M Impacts	Payback Period (Years)*
LED Fixture	\$30	\$38	\$12	1.05
VFD on 10 HP Hot Water Pump	\$1,250	\$1,136	\$34	0.57
VFD on 10 HP Chilled Water Pump	\$1,250	\$203	\$28	3.05
VFD on 20 HP Chilled Water Pump	\$2,447	\$406	\$157	1.14
VFD on 15 HP HVAC Supply/Return Fan (Roof Mounted)	\$1,875	\$1,895	\$10	0.79
VFD on 25 HP HVAC Supply/Return Fan (Roof Mounted)	\$3,125	\$11,051	\$85	0.12

*Includes value of incentive, energy savings, and O&M non-energy impacts (NEIs)

AIC NONRESIDENTIAL NEIs CASE STUDY RESULTS



LUMINAIRE LEVEL LIGHTING CONTROLS (LLLCs)



WHAT ARE LLLCS?

Luminaire level lighting controls (LLLCs) are a type of lighting system in which each individual lighting fixture has its own built-in sensor that allows the individual light fixtures to communicate with each other and transmit data wirelessly. These systems help maximize energy savings through capabilities like occupancy sensing and daylight harvesting and offer a variety of other benefits, including predictive maintenance and integration with other building systems.



PREDICTIVE MAINTENANCE

- LLLCs can provide information about when individual fixtures are likely to burn out, allowing staff to optimize bulb replacement.
- In **health care settings**, building managers could replace lights before they burn out in high risk areas, such as operating rooms. Staff could also reduce patient impact by replacing lights in patient rooms before they fail and when the room is unoccupied.
- Customers with high-bay lighting, such as **manufacturing and industrial facilities** and **hospitals** could reduce operations and maintenance costs associated with replacing bulbs requiring staging/lifts by replacing surrounding bulbs likely to burn out soon at the same time as other burnt-out bulbs. Participants valued this ability between \$10–\$20 per fixture.



SPACE AND LIGHTING OPTIMIZATION

LLLCs can improve occupant comfort and space utilization and offer building managers and occupants greater flexibility.

- LLLCs allow building managers to:
 - Automatically turn off lights when rooms are vacant
 - Dim lights when there is sufficient natural lighting
 - Optimize HVAC operation based on occupancy levels (when integrated with HVAC systems)
 - Understand real-time occupancy and density patterns
- **Manufacturing and industrial facilities** can save energy and money by automatically turning off lights when spaces are not in use.

VISUAL COMFORT

LLLCs offer greater flexibility in lighting levels and can include color tuning, circadian lighting, and scene or mood lighting, which can improve overall occupant experience.

- Building managers of in-patient **health care facilities** could program automatic dimming of lights in patient corridors at night. Participants thought this could improve patient comfort and reduce ambient noise.
- LLLCs offer **health care providers** the ability to change lighting levels depending on the space and use. Participants thought of several applications for this technology, including:
 - Patients could set the lights to dim but a nurse could brighten them to a clinical setting when checking on a patient.
 - Doctors in retina clinics could optimize the lighting levels depending on needs, avoiding the need to go to a different room if the lighting is too bright or dim.
 - One participant said researchers in their cancer research center need to vary lighting levels on a room-by-room and task basis, such as when they are looking at something under a microscope.



ASSET TRACKING

Physical asset tags that communicate with individual lighting fixture sensors can be used to track equipment, assets, and people in real-time.

- One **health care** customer estimated they spend hundreds of hours a year tracking down equipment and valued the ability to track equipment such as wheelchairs, ventilators, IV pumps, or specialty patient beds at \$100 per piece of equipment.
- In **industrial and warehouse applications**, this feature could help track mobile equipment and reduce time spent tracking down lost or missing tools and equipment or take the place of, or supplement, manual inventory management systems.