# AR ${AR}: Switch to LED Lighting

**Recommended Action**

Replace ${AREAS} lights with high-efficiency LED lights which provide equivalent lighting.

**Summary of Estimated Savings and Implementation Costs**

|  |  |
| --- | --- |
| Annual Cost Saving | ${ACS} |
| Implementation Cost | ${MIC} |
| Payback Period | ${PB} |
| Annual Electricity Savings | ${ES} kWh |
| Annual Demand Savings | ${DS} kW |
| ARC Number | 2.7142.3 |

**Current Practice and Observations**

Replacing the old lights with new light emitting diode (LED) lights inside the plant will save energy. This AR will indicate the additional savings realized by replacing all existing old lights with new, reliable, and highly-efficient LED technology lights.

Higher efficiency lighting has been a focus for many lighting manufacturers in recent years. New technology has led to light emitting diode lights that have a longer rated life, require less wattage for use, and do not use toxic chemicals, such as ${PREV1} do. First introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness. Also, the measure of light per watt from new LED lights on the market is quickly surpassing current ${PREV1}, and accounting for the higher rate of lumen degradation with time of existing lighting fixtures versus LED lighting oftentimes less LED bulbs/fixtures can provide the same level of lighting as the existing system.

**Light-Emitting Diode (LED) Lighting**

LED technology is currently the primary focus of research and manufacturing for lighting companies, such as General Electric and Phillips. This research and development is leading to LED lighting products that are more efficient converting electrical energy to light, use less power, and have a much longer lifespan, while supplying a comparable amount of light. Since LED lights are solid state, they can be cycled on and off very frequently, and they reach their lighting potential within microseconds, unlike T-8 bulbs, which can take minutes to reach full brightness. Additionally, high frequency cycling does not cause damage to LED lighting, unlike fluorescent lighting, which will burn out faster. The number of lumens from LED lights has been shown to decay less over the operational lifecycle versus traditional metal halides or fluorescent bulbs, see figure below.

Chart

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**Figure 1:** **Lumen Depreciation for Conventional Sources[[1]](#footnote-1)**

Color improvements with a blue-white light and improved uniformity cause the overall visibility to improve through LED bulbs, even though as much as 43% less foot-candles may be present. All these advantages make indoor LED lighting solutions ideal for the plant area applications requested by your plant.

1. Lumen Maintenance and Light Loss Factors: Consequences of Current Design Practices for LEDs, Pacific Northwest National Laboratory [↑](#footnote-ref-1)