

OPPORTUNITY

How much energy could GSA save by converting LFLs to LEDs?

134 GWH
ELECTRICITY/YEAR

REPLACING 1.53 MILLION LINEAR FLUORESCENT LAMPS (LFLS)
\$15 MILLION ANNUAL SAVINGS

at national average utility rate of \$0.11/kWh¹

TECHNOLOGY

How do these LED Retrofits work?

REPLACE LAMP AND LED DRIVER

USING EXISTING LENS & FIXTURE; NO NEED TO ALTER CEILING GRID

Compatible with advanced lighting controls (ALCs)

M&V

Where did Measurement and Verification occur?

PACIFIC NORTHWEST NATIONAL LABORATORY assessed two LED retrofits ("LED-A" and "LED-B") provided by NEXT Lighting and Cree in three federal buildings: GSA's regional headquarters in Auburn, Washington; the Cabell Federal Building in Dallas, Texas; and the Veterans Administration Center in Philadelphia, Pennsylvania

RESULTS

How did LED Retrofits perform in M&V?

27-29%
ENERGY SAVINGS²

ADDITIONAL SAVINGS POSSIBLE WITH ALC

EASY
INSTALLATION

SIMILAR TO LFL LAMP AND BALLAST REPLACEMENT³

6
YR PAYBACK

AT NAT'L AVG. UTILITY RATE (\$0.11/kWh) & \$50 FIXTURE COST⁴

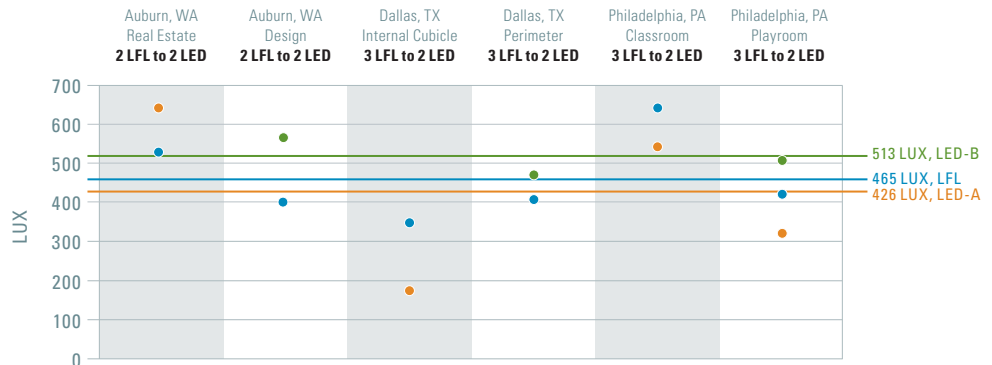
Average Light Levels Across Test-Bed Sites

LED retrofits had similar illuminance levels but different light output (LED-A, 4500 lumens; LED-B, 4400 lumens)

Key

- LFL
- LFL AVERAGE
- LED-A
- LED-A AVERAGE
- LED-B
- LED-B AVERAGE

A difference of less than 100 Lux is typically not noticeable by the human eye.



DEPLOYMENT

Where does M&V recommend deploying LED Retrofits?

FIXTURES WITH LENSES AND SOCKETS IN GOOD CONDITION

And where ALC is desired or useful. To assess fit, light levels, color temperature and glare, test a small number of lights before committing to purchase.

LED Retrofit Options Assessed During M&V

Consider compatibility and controls when selecting an LED replacement

	PROS	CONS	COST*
LED-A Replacement lamp uses alternative mounting, LED driver	<ul style="list-style-type: none"> • Lamps can be repositioned in the fixture • Dimming & ALC possible 	<ul style="list-style-type: none"> • Performance depends on optics & lens of existing fixture • Self-tapping screws could cause electrical problems • Wire harnesses won't always fit legacy situations • Not compatible with master/remote configurations or shunted lamp holders 	<p>Equipment: \$40–\$70</p> <p>Installation: \$34–\$68</p>
LED-B Replacement lamp uses existing socket, LED driver	<ul style="list-style-type: none"> • Familiar installation process • Compatible with shunted and unshunted lamp holders • Dimming & ALC possible 	<ul style="list-style-type: none"> • Performance depends on optics & lens of existing fixture 	<p>Equipment: \$40–\$70</p> <p>Installation: \$34–\$68</p>

* 50% and 100% RS Means derived labor estimates; similar cost to lamp + ballast replacement

¹Linear LED Lighting Retrofit Assessment, EE Richman, JJ McCullough, TA Beeson (PNNL), September, 2016, p.2 ²Ibid, p.5

³Ibid, p.61 ⁴Ibid, p.10