**OPPORTUNITY**

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

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**TECHNOLOGY**

How do these LED Retrofits work?

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**M&V**

Where did Measurement and Verification occur?

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**RESULTS**

How did LED Retrofits perform in M&V?

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**DEPLOYMENT**

Where does M&V recommend deploying LED Retrofits?

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**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.

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**LED Retrofit Options Assessed During M&V**

Consider compatibility and controls when selecting an LED replacement.

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**GPG FINDINGS**

The GPG program enables GSA to make sound investment decisions in next generation building technologies based on their real world performance.

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**TLED LIGHTING RETROFITS WITH DEDICATED DRIVERS**

REPLACING 1.53 MILLION LINEAR FLUORESCENT LAMPS (LFLs) $15 MILLION ANNUAL SAVINGS at national average utility rate of $0.11/kWh

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**134 GWH ELECTRICITY/YEAR**

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**REPLACE LAMP AND LED DRIVER**

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

Compatible with advanced lighting controls (ALCs)

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**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

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**27-29% ENERGY SAVINGS**

ADDITIONAL SAVINGS POSSIBLE WITH ALC

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**6 YR PAYBACK**

AT NAT’L AVG. UTILITY RATE ($0.11/kWh) & $50 FIXTURE COST

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**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)

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**LED Retrofit Options Assessed During M&V**

Consider compatibility and controls when selecting an LED replacement.

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**PROS**

- Replacement lamp uses alternative mounting, LED driver
- Lamps can be repositioned in the fixture
- Dimming & ALC possible
- Performance depends on optics & lens of existing fixture
- Self-latching screws could cause electrical problems
- Wire harnesses won’t always fit legacy situations
- Not compatible with master/remote configurations or shunted lamp holders

**CONS**

- Equipment: $40–$70
- Installation: $34–$68

**LED-A Replacement lamp uses alternative mounting, LED driver**

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**PROS**

- Familiar installation process
- Compatible with shunted and unshunted lamp holders
- Dimming & ALC possible
- Performance depends on optics & lens of existing fixture

**CONS**

- Equipment: $40–$70
- Installation: $34–$68

**LED-B Replacement lamp uses existing socket, LED driver**

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**SEPTEMBER 2016**

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Linear LED Lighting Retrofit Assessment, EE Richman, JJ McCullough, MA Reason (PNNL), September, 2016, p. 2

Linear LED Lighting Retrofit Assessment, EE Richman, JJ McCullough, MA Reason (PNNL), September, 2016, p. 61

Linear LED Lighting Retrofit Assessment, EE Richman, JJ McCullough, MA Reason (PNNL), September, 2016, p. 10

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The GPG program enables GSA to make sound investment decisions in next generation building technologies based on their real world performance. www.gsa.gov/gpg