GPG FINDINGS

026

APRIL 2016

LED DOWNLIGHT LAMPS FOR CFL FIXTURES

OPPORTUNITY

How much energy could GSA save by converting CFL downlights to LED?

5.7 GWH OF ELECTRICITY PER YEAR

If all 95,000 CFL-based downlights within the portfolio were replaced[1]

Annual savings of $600,000 at national average of $0.11/kWh

TECHNOLOGY

How do direct replacement LED downlight lamps work?

ONE-TO-ONE LAMP REPLACEMENT

POWERED BY THE EXISTING CFL BALLAST

Light directed down toward living and work surfaces

M&V

Where did Measurement and Verification occur?

PACIFIC NORTHWEST NATIONAL LABORATORY assessed LED downlight lamps provided by Lunera 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 downlight lamps perform in M&V?

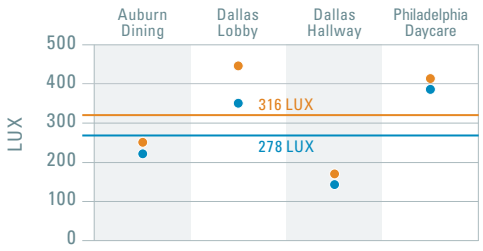
40-50%
ENERGY SAVINGS[2]
$6.37 ANNUAL SAVINGS[3]
Over typical CFL lamp at avg. utility rate of $0.11/kWh

LEDs
APPROXIMATED CFLS
OCCUPANTS NOTICED LITTLE DIFFERENCE[4]

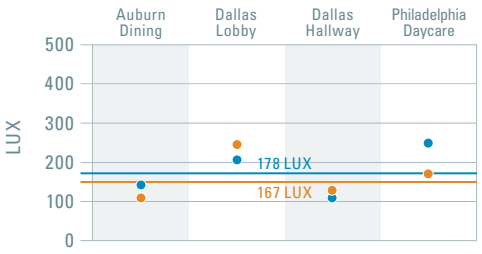
< 3
YR PAYBACK
AT AVERAGE UTILITY RATE[5]

Light Levels Between CFL and LED Were Comparable

Average Horizontal Light Levels
Work Surface or Floor



Average Vertical Light Levels
Wall



Key
- CFL
- CFL AVG. ACROSS TEST BEDS
- LED
- LED AVG. ACROSS TEST BEDS

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

DEPLOYMENT

Where does M&V recommend deploying LED downlight lamps?

DEPLOY BROADLY

Where advanced lighting controls are not desired or useful

LED Replacement Options for CFL Downlights

Consider compatibility and controls when selecting an LED replacement

	REPLACE LAMP IF :	INSTALL RETROFIT KIT IF :	INSTALL NEW FIXTURE IF :
COMPATIBILITY	CFL ballast is verified to work with LED replacement lamp (per manufacturer or by testing).	Lamp is incompatible with CFL ballast (consult manufacturer specifications).	New construction or renovation.
CONTROLS	No controls are necessary.	Dimming is desired and CFL ballast does not support it.	Integrated advanced lighting controls are desired (tuning, occupancy sensing, daylighting).
	PAYBACK–2.9 years* Cost $39 Material $22§, Install $17 With ballast replacement $94 (Material $38, Install $56) PAYBACK 7.1 years	**PAYBACK –10.4 years*** Cost $137 Material $81, Install $56	**PAYBACK–12.4 years*** Cost $165 Material $109, Install $56

*Assumes maintenance savings included; midrange material cost; RSMeans derived labor estimates; national average energy rate $0.11; 4000-hr/yr operation

§April 2016 — updated material cost of $15, provided by the vendor, reduces payback to 2.4 years

[1] *LED Downlight Lamps for CFL Fixtures*, EE Richman, JJ McCullough, TA Beeson, SA Loper (PNNL), March 2016, p.17 [2] Ibid, p.10
[3] Ibid, p.12 [4] Ibid, p.11 [5] Ibid, p.12

GSA

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**