

AR No. 2

Replace Incandescent Lamps

Recommended Action

Replace sixty-three 150-watt incandescent lamps with 34-watt energy efficient compact fluorescent lamps throughout the plant. Savings occur because compact fluorescent lamps provide more light for each watt of power. Annual operating costs for compact fluorescent lamps are approximately 70% less than incandescent lamps.

Assessment Recommendation Summary			
Energy (10 ⁶ Btu)	Cost Savings	Implementation Cost	Payback (years)
53	\$1,457	\$1,102	0.8

Background

Currently incandescent lamps are being used in the upstairs storage areas as well as the small storage area on the main floor. We suggest replacing these incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps have an average life of 10,000 hours, versus 750 hours for an incandescent lamp, and therefore will not need to be replaced as often. This results in significant maintenance, material, and labor savings. The light level will be similar despite a large difference in power, 34 watts for compact fluorescent lamp versus 150 watts for incandescent lamp.

Anticipated Savings

The demand and energy savings are calculated in the following Lamp worksheet. The methods and terminology used in the lighting worksheet are described in Appendix B. Power and energy savings, based on the worksheet, will be:

$$\text{Power (P)} = 7.4 \text{ kW}$$

$$\text{Energy (E)} = 15,392 \text{ kWh/yr}$$

Demand cost savings (DC) is found by multiplying power savings by the monthly demand change.

$$\begin{aligned} \text{DC} &= P \times 2.28/\text{kW-month} \times 12 \text{ months/yr} \\ &= 7.04\text{kW} \times \$2.86/\text{kW-month} \times 12 \text{ months/yr} \\ &= \$254 \end{aligned}$$

Energy cost savings (EC) are found by multiplying the energy savings by the energy cost (\$E).

$$\begin{aligned}
 EC &= E \times \$E \\
 &= 15,392 \text{ kWh/yr} \times \$0.04849/\text{kWh} \\
 &= \$746
 \end{aligned}$$

The annual operating cost savings, which include power, energy, maintenance labor, and maintenance materials, are summarized on the following page and in the Savings Summary Table.

Savings Summary			
Source	Quantity	Units	Energy Cost 10 ⁶ Btu \$
Demand	7.4	kW	0 \$ 254
Electric Energy	15,392	kWh	53 \$ 746
Maintenance Material Cost Savings (MMC)			\$ 55
Maintenance Labor Cost Savings (MLC)			\$ 402
Total			53 \$1,457

Implementation Cost

34-watt Compact fluorescent bulbs can be purchased at most hardware and building supply stores for approximately \$15/bulb. We estimate that an incandescent lamp can be replaced with a compact fluorescent lamp in 1/6th of an hour at a maintenance labor rate of \$15.00 per hour. The total implementation cost (IC) is:

$$IC = (L\# \times C/L) + \text{Labor Charge}$$

where

$$L\# = \text{number of lamps: } 63$$

$$C/L = \text{retail lamp cost per lamp: } \$ 15$$

$$\begin{aligned}
 IC &= (63 \times \$15) + (63 \times 1/6 \times \$15) \\
 &= \$1,102
 \end{aligned}$$

The cost savings will pay for the implementation in 0.8 years.

REPLACE 63 INCANDESCENT LAMPS

PLANT DATA

Bldg.:		Report Number:	
Area:		Demand Cost (D\$):	\$2.86 /kW-mo.
Lamp Replacement Time:	1/6 hours	Energy Cost (E\$):	\$0.04849 /kWh
Ballast Replacement Time:	1/6 hours	Rec. Foot-candles:	0
Fixture Replacement Time:	1 hours	Maintenance Labor Rate:(\$/H)	\$15.00 /hour
		Lamp Replacement Employee	\$15.00 /hour

FIXTURES

	Symbol	Existing	Proposed	Savings	Units
LAMP CODE		1150	CF39		
Description:	FID	Incandescent	Compact Fluorescent		
Quantity:	F#	63	63	0	
Operating Hours:	H	2,080	2,080	0	hours
Use Factor:	UF	100%	100%	0%	
Lamps/Fixture:	L/F	1	1	0	
Ballasts/Fixture:	B/F	0	0	0	
Cost:	C/F	\$37.29	\$37.29	\$0.00	

LAMPS

Description:	LID	1150	CF39		
Quantity:	L#	63	63	0	
Life:	LL	750	10,000	(9,250)	hours
Cost:	C/L	\$1.50	\$15.00	(\$13.50)	
Replacement Fraction:	Lf	277%	21%	257%	
Watts/Lamp:	W/L	150	39	111	watts
Lumens:	LM	2,850	2,365	485	
Maintenance Replacement Cost:	LRC	\$262.08	\$196.56	\$65.52	
Maintenance Labor Cost:	LLC	\$435.05	\$32.63	\$402.42	

BALLASTS

BALLAST CODE		0	0		
Description:	BID	N/A	N/A		
Quantity:	B#	0	0	0	
Life:	BL	0	0	0	hours
Cost:	C/B	\$0.00	\$0.00	\$0.00	
Replacement Fraction:	Bf	0%	0%	0%	
Ballast Factor:	BEF	0%	0%	0%	
Input Watts:	IW	0	0	0	watts
Maintenance Replacement Cost:	BRC	\$0.00	\$0.00	\$0.00	
Maintenance Labor Cost:	BLC	\$0.00	\$0.00	\$0.00	

POWER AND ENERGY

Total Power:	P	9.5	2.5	7.0	kW
Energy Use:	E	19,760	5,200	14,560	kWh

LIGHT LEVEL CHECK

Total Lumens:	TLM	179,550	148,995	30,555	
Foot-candles:	FC	0	0	0	
Lighting Efficiency:	LM/W	19.0	60.6	41.6	

ANNUAL OPERATING COST

Total Power Cost:	PC	\$326	\$86	\$240	
Energy Cost:	EC	\$958	\$252	\$706	
Maintenance Material Cost:	MMC	\$262	\$197	\$66	
Maintenance Labor Cost:	MLC	\$435	\$33	\$402	
Total Operating Cost:	OC	\$1,981	\$567	\$1,414	

IMPLEMENTATION COST

Materials:	M\$		\$945	\$945	
Labor:	L\$		\$157	\$157	
Total Cost:	IC		\$1,102	\$1,102	

SIMPLE PAYBACK

SP	0.8	years
----	-----	-------