### Fluorescent Delamping

###### Description

This measure addresses the permanent removal of existing 8’, 4’, 3’ and 2’ fluorescent lamps. Unused lamps, lamp holders, and ballasts must be permanently removed from the fixture. This measure is applicable when retrofitting from T12 lamps to T8 lamps or simply removing lamps from a T8 fixture. Removing lamps from a T12 fixture that is not being retrofitted with T8 lamps are not eligible for this incentive.

Customers are responsible for determining whether or not to use reflectors in combination with lamp removal in order to maintain adequate lighting levels. Lighting levels are expected to meet the Illuminating Engineering Society of North America (IESNA) recommended light levels. Unused lamps, lamp holders, and ballasts must be permanently removed from the fixture and disposed of in accordance with local regulations. A pre-approval application is required for lamp removal projects.

This measure was developed to be applicable to the following program types: RF.

If applied to other program types, the measure savings should be verified.

###### Definition of Efficient Equipment

Savings are defined on a per removed lamp basis. The retrofit wattage (efficient conditioned) is therefore assumed to be zero. The savings numbers provided below are for the straight lamp removal measures, as well as the lamp removal and install reflector measures. The lamp installed/retrofit is captured in another measure.

###### Definition of Baseline Equipment

The baseline condition is either a T12 or a T8 lamp with default wattages provided below. Note, if the program does not allow for the lamp type to be known, then a T12:T8 weighting of 80%:20% can be applied[[1]](#footnote-1).

###### Deemed Lifetime of Efficient Equipment

The measure life is assumed to be 11 years per DEER 2005.

###### Deemed Measure Cost

The incremental capital cost is provided in the table below:

|  |  |  |
| --- | --- | --- |
| Measure Category | Value | Source |
| 8-Foot Lamp Removal | $16.00 | ComEd/KEMA regression[[2]](#footnote-2) |
| 4-Foot Lamp Removal | $12.00 | ICF Portfolio Plan |
| 8-Foot Lamp Removal with reflector | $30.00 | KEMA Assumption |
| 4-Foot Lamp Removal with reflector | $25.00 | KEMA Assumption |
| 2-Foot or 3-Foot Removal | $12.35 | KEMA Assumption |
| 2-Foot or 3-Foot Removal with reflector | $25.70 | KEMA Assumption |

###### Loadshape

|  |
| --- |
| Loadshape C06 - Commercial Indoor Lighting |
| Loadshape C07 - Grocery/Conv. Store Indoor Lighting |
| Loadshape C08 - Hospital Indoor Lighting |
| Loadshape C09 - Office Indoor Lighting |
| Loadshape C10 - Restaurant Indoor Lighting |
| Loadshape C11 - Retail Indoor Lighting |
| Loadshape C12 - Warehouse Indoor Lighting |
| Loadshape C13 - K-12 School Indoor Lighting |
| Loadshape C14 - Indust. 1-shift (8/5) (e.g., comp. air, lights) |
| Loadshape C15 - Indust. 2-shift (16/5) (e.g., comp. air, lights) |
| Loadshape C16 - Indust. 3-shift (24/5) (e.g., comp. air, lights) |
| Loadshape C17 - Indust. 4-shift (24/7) (e.g., comp. air, lights) |
| Loadshape C18 - Industrial Indoor Lighting |
| Loadshape C19 - Industrial Outdoor Lighting |
| Loadshape C20 - Commercial Outdoor Lighting |

###### Coincidence Factor

The summer peak coincidence factor for this measure is dependent on the location type. Values are provided for each building type in the reference section below.

**Algorithm**

###### Calculation of Savings

###### Electric Energy Savings

ΔkWh =((WattsBase-WattsEE)/1000) \* ISR \* Hours \* WHFe

Where:

WattsBase = Assume wattage reduction of lamp removed

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Wattage of lamp removed**[[3]](#footnote-3) | | **Weighted average** |
|  | **T8** | **T12** | **80% T12, 20% T8** |
| 8-ft T8 | 38.6 | 60.3 | 56.0 |
| 4-ft T8 | 19.4 | 33.7 | 30.8 |
| 3-ft T8 | 14.6 | 40.0 | 34.9 |
| 2-ft T8 | 9.8 | 28.0 | 24.4 |

WattsEE = 0

ISR = In Service Rate or the percentage of units rebated that get installed.

=100% if application form completed with sign off that equipment permanently removed and disposed of.

Hours = Average hours of use per year are provided in Reference Table in Section 4.5. If unknown use the Miscellaneous value.

WHFe = Waste heat factor for energy to account for cooling energy savings from efficient lighting are provided below for each building type in Reference Table in Section 4.5. If unknown, use the Miscellaneous value.

For example, delamping a 4 ft T8 fixture in an office building:

ΔkWh =((19.4 - 0)/1000) \* 1.0 \* 4439 \* 1.25

= 107.6 kWh

###### Heating Penalty

If electrically heated building:

ΔkWhheatpenalty[[4]](#footnote-4) = (((WattsBase-WattsEE)/1000) \* ISR \* Hours \* -IFkWh

Where:

IFkWh = Lighting-HVAC Interation Factor for electric heating impacts; this factor represents the increased electric space heating requirements due to the reduction of waste heat rejected by the efficent lighting. Values are provided in the Reference Table in Section 4.5. If unknown, use the Miscellaneous value.

For example, delamping a 4 ft T8 fixture in a heat pump heated office building:

ΔkWhheatpenalty =((19.4 - 0)/1000) \* 1.0 \* 4439 \* -0.151

=-13.0 kWh

###### Summer Coincident Peak Demand Savings

ΔkW= ((WattsBase-WattsEE)/1000) \* ISR \* WHFd \* CF

Where:

WHFd = Waste heat factor for demand to account for cooling savings from efficient lighting in cooled buildings is provided in the Reference Table in Section 4.5. If unknown, use the Miscellaneous value..

CF = Summer Peak Coincidence Factor for measure is provided in the Reference Table in Section 4.5. If unknown, use the Miscellaneous value..

Other factors as defined above

For example, delamping a 4 ft T8 fixture in an office building:

ΔkWh =((19.4 - 0)/1000) \* 1.0 \* 1.3 \* 0.66

= 0.017 kW

###### Natural Gas Energy Savings

Heating Penalty if fossil fuel heated building (or if heating fuel is unknown):

ΔTherms[[5]](#footnote-5) = (((WattsBase-WattsEE)/1000) \* ISR \* Hours \*- IFTherms

Where:

IFTherms = Lighting-HVAC Interation Factor for gas heating impacts; this factor represents the increased gas space heating requirements due to the reduction of waste heat rejected by the efficent lighting. Values are provided in the Reference Table in Section 4.5. If unknown, use the Miscellaneous value.

Other factors as defined above

For example, delamping a 4 ft T8 fixture in an office building:

ΔTherms =((19.4 - 0)/1000) \* 1.0 \* 4439 \* -0.016

=-1.4 therms

###### Water Impact Descriptions and Calculation

N/A

###### Deemed O&M Cost Adjustment Calculation

N/A

###### Measure Code: CI-LTG-DLMP-V02-140601

1. Based on ComEd’s estimate of lamp type saturation. [↑](#footnote-ref-1)
2. Based on the assessment of active projects in the 2008-09 ComEd Smart Ideas Program. See files “ltg costs 12-10-10.xl.” and “Lighting Unit Costs 102605.doc” [↑](#footnote-ref-2)
3. Default wattage reducetion is based on averaging the savings from moving from a 2 to 1, 3 to 2 and 4 to 3 lamp fixture, as provided in the Standard Performance Contract Procedures Manual: Appendix B: Table of Standard Fixture Wattages (<http://www.sce.com/NR/rdonlyres/7A3455F0-A337-439B-9607-10A016D32D4B/0/spc_B_Std_Fixture_Watts.pdf>). An adjustment is made to the T8 delamped fixture to account for the significant increase in ballast factor. See ‘Delamping calculation.xls’ for details. [↑](#footnote-ref-3)
4. Negative value because this is an increase in heating consumption due to the efficient lighting. [↑](#footnote-ref-4)
5. Negative value because this is an increase in heating consumption due to the efficient lighting. [↑](#footnote-ref-5)