Appendix O:

C&I Lighting Policy

Introduction

On January 12, 2011 Staff issued a SAPA Notice, in part on proposals to implement directives in the Commission's October 18, 2010 order in Case 07-M-0548 regarding benefit/cost analysis for Special Circumstance customers in Energy Efficiency Portfolio Standard (EEPS) programs.[1] In its 2/28/11 comments, National Grid sought clarification regarding: whether field staff must determine the age of lighting fixtures in place and how to treat lighting replacement where the age of the fixture in place is past its prescribed effective useful life (EUL). With regard to these lighting issues, the Commission in its July 18, 2011 order in the EEPS proceeding directed[2] "the Implementation Advisory Group to attempt to resolve the issues of determining the age of lighting equipment and the correct approach for valuing savings from lighting replacements[3] under the mechanism we provided for modifying the Consolidated Technical Manual [CTM] in our June 20, 2011 Order in this proceeding."[4]

Regarding commercial and industrial lighting issues,[5] the technical manual, effective 1/1/11 [*as modified September 2012*], states: "The baseline condition is assumed to be the existing

1 SAPA 07-M-0548SP30 - Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard.
2 Order Approving Modifications to the Technical Manual, pps 16-17.
3 Savings are related to the type of bulb used in the fixture.
4 New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs, October 15, 2010, p.109, http://www.dps.ny.gov/TechManualNYRevised10-15-10.pdf.
5 C&I lighting includes multifamily building common areas for the purposes of this paper.

[and operational] lighting fixture in *[all applications other than new construction or extensive renovations which trigger the building code*]."[6] This makes the savings baseline and costs for TRC analysis independent of the age of the operational fixture. This approach reflects the frequent impracticality of determining the age of lighting fixtures

Absent this provision, replacement of fixtures in place which are either (1) irreparable (unusable and not economic to repair) or, (2) operating and not demonstrably younger than their EUL (in short, broken or past EUL) would be treated as normal/end of life replacement: modeled with incremental costs and with incremental savings for the full EUL of the new measure, including for first year scorecard reporting.[7] Fixtures in place in working order and demonstrably aged below their EUL would get early replacement treatment which, for most non-lighting measures, would mean dual baseline treatment per Appendix M. Appendix M, however, excludes lighting from such treatment.[8] Therefore the conventional early replacement modeling of full costs and full savings would still apply, with the full savings against the old fixture in place modeled for the full EUL of the new equipment and reported as first year scorecard savings.

To answer National Grid's questions, and in compliance with the instructions in the 7/18/11 order, this appendix prescribes

[6] The bracketed language has been approved and is in the redline version of the technical manual to be presented in February 2013.

7 Incremental means the costs and consumption of the high efficiency model promoted by the program minus the costs and consumption of the standard efficiency level alternative – Federal minimum appliance standards, State building codes or, in the absence of codes and standards, the common practice.

8 Appendix M, posted with the technical manual, fn #5, p. 10.

principles for C&I lighting replacements, both replacements of operational fixtures and irreparable fixtures, addressing:

- replacements for which incentive funding is precluded, as a practical matter of presumptive TRC failure by definition;
- inputs for TRC ratio calculations;
- age determination requirements (none); and
- values for reporting as first year annualized savings against targets approved in orders (the same as the first year savings modeled in the TRC analysis).

The Overall Principles

If a lighting fixture of any age is operational, replacement is early replacement. The full savings against the fixture in place[9] will be reported as first year savings and modeled for the full EUL of the replacement measure in TRC screening. Costs will be full costs, the total costs of the replacement, as is usual for early replacement analysis outside Appendix M.[10]

For irreparable lighting fixtures, normal/end of life rules apply: incremental savings and costs between the common practice

9 The full savings differs from incremental savings in subtracting the consumption of the fixture supported by the program from the consumption of the fixture in place, not from the consumption of the current common alternative.

10 If passing the TRC, however, is a concern, PAs may choose to document an age past the EUL to be able to model the incremental costs used re: normal replacement as opposed to the full costs usual for early replacement.

and the high efficiency measures promoted by EEPS are used for TRC analysis; incremental savings are used for first year scorecard savings; and no age determination is required.

Discussion by Type of Equipment Replaced

The lighting upgrades considered here are: screw-in incandescent fixtures (which will evolve toward use of halogen lamps)[11] replaced with CFL or LED fixtures; and linear fluorescent T12 or standard T8 replaced with Super T8s, T5s or LEDs.[12] The fixtures in place may be either in good working order (early replacement) or irreparable (normal replacement).

Baselines

Screw-In Fixtures

Screw-in fixtures are expected to continue to accommodate the least efficient bulb types which still meet the national lighting standards established under the Energy Independence and Security Act of 2007 (EISA). Therefore, the baseline choice for early or normal replacement with any pin-based fixtures remains screw-in fixtures: either to keep a working fixture in place or to replace an irreparable one with a new screw-in fixture. Once the EISA standard is phased-in for a particular bulb size the least efficient bulb technology meeting the standard would

[11] Halogen bulbs consume approximately 72% as much as incandescent bulbs. Whereas the CTM reports a delta of watts consumption of 2.53 between CFLs and incandescent, the delta would be approximately 1.55 for CFLs against halogens. This means that 1.55 times the CFL wattage is the savings delta against a halogen lamp.

[12] Speaking only of the types whose replacement are usual subjects of EEPS programs, thus not including high intensity discharge (HID) fixtures, metal halide, high pressure sodium, mercury vapor, *or CFLs or LEDs yet*. Perhaps at some point it will be cost effective to replace CFLs with LEDs.

normally be considered the baseline. Incandescent bulbs, however, are expected to remain in inventories for sale and are reportedly being stockpiled. A screw-in fixture can house, for baseline consumption relative to CFLs, either incandescent or halogen bulbs. Therefore, baselines will be based upon deemed years, for each wattage range, in which installation of the new common practice technology, halogen lamps, is more likely than installation of stockpiled incandescent lamps.[13] Until reconsideration (based on studies in progress and program experience) in March 2015,incandescent bulbs will remain the baseline.

For fixtures compatible with incandescent and halogen lamps, TRC analysis of a measure or project may be occurring before the deemed switch year or after it. Analysis done before the estimated switch year will entail two baselines of consumption during the EUL of the screw-in alternative to CFL.[14] The first baseline will be incandescent consumption until the beginning of the deemed switch year,[15] the second baseline being halogen consumption. In future TRC analysis after the deemed switch dates, the baseline for incremental savings will be halogens against CFLs throughout.

[13] While in reality the technology mixes will shift gradually, the baselines as executed here will require selection of the year in which the probable majority choice will switch.
[14] Screw-in LEDs are unlikely in the C&I context in which quality concerns require LED fixtures.
[15] While incandescent bulbs installed before the switch year may remain in use during it, this would probably be for a short time given the usual heavy C&I usage. Additionally, fractional year modeling isn't practical.

Linear Fluorescent Fixtures

For early replacement of an operational T12 fixture, the baseline relative to super T8s is simply the consumption of the T12 lamp. For normal replacement of an irreparable T12 fixture, the baseline, until reconsideration (based on studies in progress and program experience)in March 2015, is the consumption of a T12. At some point, customers will no longer be installing relatively inefficient T12 fixtures in significant numbers as lamp availability decreases[16] and therefore standard T8s will be the common practice and thus the suitable linear fluorescent baseline for consideration of appropriate super T8s and T5s.

Eligibility for Rebates

The next issue is potential cost-effectiveness and thus measures' eligibility for rebates. Incentives for CFL (and potentially for LEDs) pin fixtures, as needed and if cost-effective, may continue to be appropriate for some years to come.[17] Incandescent/halogen fixtures may remain in use indefinitely, with halogens being less expensive upfront as well as more familiar looking than CFLs or LEDs. Replacement of screw-in fixtures with new screw-in fixtures may continue, and thus incentives for replacement with higher efficiency technologies make sense.

Turning to rebate-eligibility of linear fluorescent fixtures, since installation of T12 fixtures will be unlikely at some

[16] This will not happen often enough to justify ratepayer subsidy of all replacements to avoid the occasional instance. Retrogression from T8 to T12 is particularly unlikely.
[17] And the same for screw-in CFL lamps for incandescent/halogen fixtures.

point and replacement of a standard T8 fixture with a standard T8 fixture would yield no savings. At that point, savings will exist and cost-effective incentives will be payable only for installation of super T8s (or T5s)in watts-saving configurations. Super T8s produce more lumens per watt and have improved color rendering and a longer rated life, but since ratepayers should not pay for extra lumens, incentives should be paid only for projects which reduce the overall wattage of fixtures relative to standard T8s.

Costs to be Modeled

The last issue is costs to be modeled in TRC screening. For early replacement of operational, screw-in incandescent/halogen fixtures, the TRC screening would as usual include the full *costs* of the replacement, additionally owing to the indefinite remaining life of the fixture in place, and to the continued availability of inexpensive screw-in fixtures usable for halogens. Since most equipment replaced will be in working order, the full-costs case will be the most common, but with incremental costs for normal replacement of irreparable fixtures.

Turning to costs to be modeled for linear fluorescent fixtures, operational standard T8s can remain in place for some years, and therefore full costs for early replacement are fully appropriate. If age past the EUL is documented, however, PAs may model incremental costs for normal replacement. Also as a case of normal replacement, since irreparable standard T8 fixtures can be replaced with like, the modeling of incremental costs for super T8 fixtures is justified.