

## **Farewell T12s, Parting is Such Sweet Sorrow**

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### **Introduction**

Commercial lighting constitutes approximately 30% of commercial electricity usage, and as a result, lighting energy efficiency programs are usually the largest source of commercial sector savings for most utilities. According to a recent DOE report, linear fluorescents are the predominant commercial area lighting technology, and T12s are 33% of the 2010 linear fluorescent stock. So although the conversion/replacement of T12s to T8-T5s has been encouraged for many years by utility programs, this seems to show that, to paraphrase Mark Twain, the reports of the death of T12s have been greatly exaggerated. However, the latest lighting standard legislation ensures that the imminent demise of T12s is only a matter of time.

### **Farewell T12s (and 700-series T8s!).....**

The Energy Policy Act of 2005 (EPAct) was a sweeping piece of legislation, enacting the most significant update to the nation's energy policy since the 1990s. The most recent impact of this legislation occurred in July 2012, when federal lighting standards, via new lamp efficacy (lumens per watt) requirements, prohibited the manufacture of almost all 8-foot and 4-foot T12s. This legislation also affects first-generation, 700-series T8 lamps, which also do not meet the new lamp efficacy standards. However, a two-year extension was granted to allow these lamps to be manufactured until July 2014. Another significant issue to consider is that the Standards only prevent the *manufacture* of these lamps, so they can and will continue to be sold, as long as there is available inventory.

### **.....Parting is Such Sweet Sorrow**

The implementation of these new lighting standards will have significant impact on energy efficiency programs, as well as implementation, evaluation, and savings potential and goals, especially retrofit lighting measure baseline assumptions and Net-to-Gross values. As the result of these actions, energy savings will be lower using a T8 baseline instead of a T12 baseline. T8 lamps will now also need to be characterized by series (700, 800 or greater) and other performance values, which can only be obtained from the lamp model number. It also means that 800-series T8 lamps will become the new baseline for linear fluorescent energy efficiency measures. There is also the issue of timing to consider, that is, should the baseline be shifted immediately to an 800-series T8 or should it be phased in slowly over a number of years (some jurisdictions have already decided on an approach). And finally, the T8 system ballast information will also be needed to characterize the system as a high-performance T8 (HPT8) system. This all requires a different, more extensive effort to characterize linear fluorescent lighting.

### **The Need: CPUC Baseline, Evaluation, and Measure Cost Studies**

Itron is conducting three studies for the California Public Utilities Commission (CPUC) that require linear fluorescent characterization. The first is the Commercial Saturation Survey-Commercial Market Share Tracking (CSS-CMST). The CSS effort is a baseline equipment saturation survey, while the CMST effort is focused on new, recent (Jan 2009) equipment purchases including linear fluorescent lighting. The second is

the Nonresidential Lighting Evaluation study, which will use the data from the CSS-CMST study for determining baselines. The third study is the Measure Cost Study, which will attempt to determine the incremental costs of linear fluorescent lamps, ballasts, and fixtures. The first two studies include on-site surveys, and are the source of the lamp and ballast make/model data being used for this effort. These projects are all still in progress, and final results and data are not expected to be available until the first quarter of 2014.

## Linear Fluorescent Performance Categories

These lookup tables will be used to determine linear fluorescent "performance categories" (non-EPA compliant, base/standard efficiency, and high efficiency), and express saturations for each category. The accurate development of the lighting performance categories, and the current shares of technologies, hinges on the collection of make and model number information and the implementation of the efficiency lookup tables. The linear fluorescent lighting performance categories that will be used for these studies, listed from least efficient to most efficient are: *T12, 700-series T8s, 800-series T8s, CEE high-performance standard-watt and reduced-watt T8s, T5s, and LED T-8 replacements*. These performance categories will be used for consistency throughout the CPUC studies that are using this data. When the revised Standards are fully in force, eventually both the T12s and 700-series T8s will need to be phased out as a baseline, and the 800-series T8s will be the new baseline.

## Lamp-Ballast Model Lookup System

Extensive make/model number reference tables are being created for both lamps and ballasts. The tables include data collected from both past and current on-site surveys. This data will be used to characterize lamp and ballast performance, as well as to determine fixture wattages which will be used for equipment saturation analysis and evaluation.

**Lamp Model Lookups.** An example lamp model number is F32T8/841/XP where the 841 represents the series. Both make and model along with lamp diameter, watts, and length are mapped to these lamp performance characteristics: CRI, Rated Lamp Life, Rated Lumens, and Consortium of Energy Efficiency (CEE) certification. Almost all energy efficiency programs require CEE HPT8 systems (lamps and ballasts). These characteristics are important because they are used to check against the Standards which define efficacy in terms of lighting performance parameters, not just by lamp type or technology (i.e. T12).

**Ballast Model Lookups.** An example ballast number is B232IUNVEL-A, where the "232" means two 32W T8 lamps. Ballast parameters are Type (electronic, magnetic), Start Type, Ballast Factor, Fixture Input Watts, and CEE-certified.

**Fixture Input Wattage Lookups.** The lamp and ballast model lookup tables will be combined with on-site survey data to determine actual fixture wattages, which will be used to calculate evaluation ex post.

## Data Applications

The linear fluorescent performance group saturation results of this study will be used as inputs in models to determine energy efficiency potential, for defining standard practice from a fixture configuration basis rather than a lighting power density basis, and by program planners to help design updates to existing lighting programs. The efficiency lookup tables will be available to utilities and the commission to true up or enhance Standard Fixture Wattage lists (which are typically used for lighting programs) and for future evaluations.