

L1 HIGH EFFICIENCY PREMIUM T8 LIGHTING (100 LUMENS/WATT)

Description of Technology

T8 electronic ballasts and lamps were introduced in the early 1980s with the promise of significantly reducing lighting energy use in commercial and institutional buildings. Since that time, manufacturers have continuously improved T8 performance, particularly with regard to reliability and features. At the same time, the product cost has decreased. However, system efficacy has remained at 85 to 88 lumens/Watt for a typical system consisting of F32T8 lamps with instant start ballasts (NLPPI 2000). The recent emergence of high efficacy Super T8 lighting systems marks real improvement when compared with generic T8s and particularly with the T12 lighting systems that were estimated to account for 75% of the U.S. commercial fluorescent lighting energy use as late as 2000 (DOE 2002b).

Current Status of Measure

In 2002, both GE Lighting and Osram Sylvania introduced Super T8 lighting systems with a claimed system efficacy of about 100 lumens/Watt; Phillips now has systems too. Ballasts are available in both 120V and 277V and will soon be available in 347V for the Canadian market. Additional advantages over standard T8 systems include higher lamp lumen maintenance and, if long-life products are selected, an extended lamp life of up to 30,000 hours vs. the standard 20,000 hours. Savings are achieved through delamping, using low ballast-factor ballasts, or through installation of fewer fixtures. Otherwise the high efficacy systems will use the same amount of energy as the conventional T8 systems, while producing a higher lighting level. Super T8s were introduced after the 1998 ET study, but have already reached market penetration well beyond 2% (Sardinsky and Benya 2003), so they are no longer emerging technologies. Thus, the super T8 is not included in our statistics. This summary is kept because many are unaware of the products and their potential.

Energy Savings and Costs

Super T8 systems (lamp and ballast) can show up to 81% improvements in efficacy (lumens/Watt) relative to T12s and 31% relative to generic T8s (Sardinsky and Benya 2003). However, the wide range of applications discussed above means that actual energy savings are generally more modest, in the range of 15–20% relative to standard T8 systems (Thorne and Nadel 2003), implying roughly 27–36% relative to older T-12s. U.S. incremental costs are in the range of \$1/bulb and \$1 to \$5 for the best ballasts (Sardinsky and Benya 2003).

Key Assumptions Used in Analysis

We consider the Super T8 for both new construction and retrofit applications assuming a two-lamp fixture with an operation of 3,400 hrs/year (DOE 2002b). For new construction, the Super T8 fixture is assessed against a two-lamp F32T8 fixture with an instant start ballast with an incremental material cost of \$5/fixture and a 20-year life. For a retrofit, the Super T8 fixture is assessed against a T12 fixture and a full cost of \$36/fixture (for ballasts and lamps, but not the fixture itself) including labor and material.

Recommended Next Steps

The main barriers to the adoption of Super T8 fluorescent lighting system are lack of awareness by end-users, confusion over similar-sounding options, and incremental cost over standard T8 fluorescent lighting. Awareness of the benefits of Super T-8 systems relative to generics is much lower, however. Collaborative promotion and awareness generation by government, utilities, and trade allies is necessary to make the Super T8 lighting fixture the preferred choice in the market. In particular, awareness is necessary of the need to use low BF ballasts or otherwise adjust the for higher-light output. End-user and trade ally education efforts, as well as limited financial incentives, may be needed for a few years until the market takes off.

L1 High Efficacy Premium T8 Lighting (100 Lumens/W)

Description Super T8 lighting product that offers maximum efficacy and increased lamp life

Market Information:

Market sector COM
 End-use(s) LIGHT
 Energy types ELEC
 Market segment NEW, RET, ROB

Basecase Information:

Description 2 Lamp F32T8 fixture with instant start electronic ballast BF 0.9
 Efficiency 60 Watts/fixture
 Electric use 216 kWh/year 3600 hrs - DOE ballast TSD
 Summer peak demand 0.050 kW
 Winter peak demand 0.044 kW
 Gas/fuel use

New Measure Information:

Description 2 Lamp F32T8 XGEN fixture with 30,000 hrs. "super" lamps, BF of .78
 Efficiency 48 Watts/fixture
 Electric use 173 kWh/year
 Summer peak demand 0.040 kW
 Winter peak demand 0.036 kW
 Gas/Fuel use
 Current status COMM
 Date of commercialization 2002
 Life 15 years for ballast

Savings Information:

Electricity 43 kWh/year
 Summer peak demand 0.010 kW
 Winter peak demand 0.009 kW
 Gas/Fuel MMBTU/year
 Percent savings 20%
 Feasible applications 85% of commercial fluorescent lighting applications.
 2020 Savings potential 34,430 GWh
 2020 Savings potential 348 TBtu (source)
 Industrial savings > 25% NO

Cost Information:

Projected Incr. Retail Cost \$5 2003 \$ Current cost, will decline. (Marbek)
 Other cost/(savings) (\$0.12) \$/year lamp savings
 Cost of saved energy \$0.009 \$/kWh
 Cost of saved energy \$0.91 \$/MMBtu
 Data quality assessment A (A-D)

Likelihood of Success:

Major market barriers Incremental price over standard T8 lighting, most users not familiar with product
 Effect on utility Improved lighting quality, longer lamp life
 Current promotion activity Some utilities are promoting technology
 Rating 4 (1-5)
 Rationale Very cost-effective which should help make this product the standard choice

Priority / Next Steps

Priority Dropped: Market penetration > 2% Benya)
 Recommended next steps Continued promotion, and education of contractors & users

Sources:

Savings Sardinsky and Benya 2003
 Peak demand HMG 1999, PGE 2000
 Cost Manufacturer product information - don't we have info from Jim Benya too?
 Feasible applications ACEEE Estimate
 Measure life DOE ISD for ballast life
 Other key sources
 Principal contacts Jim Benya, (503)519-9631, jbenya@benyalighting.com
 Notes